THE NORTH CENTRAL ASSOCIATION QUARTERLY

Volume VI CONTENTS FOR MARCH, 1932 Number 4

The
NORTH CENTRAL ASSOCIATION QUARTERLY

VOLUME VI MARCH, 1932 NUMBER 4

Association Notes and Editorial Comments

THE ANNUAL MEETING

The annual meeting of the Association will, as usual, be held in Chicago in March. The exact dates are March 17th and 18th, although the Commissions will meet somewhat earlier. The preliminary program appears elsewhere in this issue of the QUARTERLY. The Stevens Hotel will again entertain the meeting.

REDUCED RAILWAY RATES

As usual the various railway companies are this year making special rates of a fare and a half for the North Central Association meeting in Chicago. These rates are based on the Certificate Plan and a minimum of 100 applications is necessary to secure them. It is important therefore that each one, when purchasing a ticket, shall request a "Certificate Plan Certificate"; do not make the mistake of asking for a "receipt."

The rates are available from March 6 to 16 (depending on the starting point) and are valid for return any time within 30 days, provided that the certificates are validated by an authorized agent in Chicago between March 14 and 18 and provided that a return ticket is purchased on or before March 22.

REPRINTS

The Editorial office still has reprints of a number of the earlier reports and curriculum studies of the Association. Reprints of at least three articles appearing in this QUARTERLY will be struck off. The names and costs of these reprints are given herewith. Kindly send remittance when ordering.

"General Art Courses in the High School" and
"An Experimental Unit in Color," combined, (Whitford) 20c.

"Teaching Science in Secondary Schools," (Curtis) 25c.

"Experimental Use of Units in Physics," (Hurd) 15c.

"Class Size at the College Level," (Hudelson) 15c.

OUR OFFICIALS

On another page of this issue are given the names of all individuals who have held official positions in the Association during the past seventeen years (1915–32), together with the dates of their incumbencies. The list includes 97 names, and shows a pretty wide distribution of honors.

TESTING PROGRAMS

In this issue (page 359) appears the stenographic report of Dr. Ben Wood's address given last year on the subject "The Results of a Testing Program." It is unfortunate that the QUARTERLY could not reproduce the charts which Dr. Wood used in his talk. However, even without these the address as reproduced here makes very thought provoking read-

ing. Surely in the face of the facts revealed it scarcely seems possible that colleges can go on much longer basing their entrance requirements on the means and methods commonly used today. College material among youths, it would appear, is discoverable in other ways than from their school marks obtained in specified subjects of study—and in more satisfactory ways.

NORTHWESTERN UNIVERSITY ACCREDITED

Those who attended the meeting of the Association in March 1931 recall that action respecting the accrediting of Northwestern University at Evanston, Illinois, was postponed until certain further investigations respecting its administration were made. On December 12th last the Board of Review (which had the investigations in charge) passed the following resolution:

> Voted that Northwestern University be accredited for the year 1931–32 and that such reinspection be made as may seem advisable prior to the annual meeting of 1933. It is recommended that Northwestern University give careful consideration to such points of administration as were raised in the report to the Board of Review.

DR. COFFMAN'S GOODWILL VISIT

Members of the Association will be interested to know that President Coffman of the University of Minnesota, and Mrs. Coffman, are at this writing on an extended trip through New Zealand and Australia, he having been chosen as visiting Carnegie professor charged with the mission of promoting education, understanding and goodwill between America and these island continents in the Pacific. The Carnegie Corporation has recently been making grants of money to various institutions and agencies in New Zealand and Australia and Dr. Coffman was delegated to study their conditions and needs and to report his observations to the Corporation.

President and Mrs. Coffman expect to return to the United States by way of China and the Phillipines late in February.

HIGHER STANDARDS FOR ADMINISTRATORS

Recently a letter came to the Editorial desk from a high school principal in Kansas—Mr. J. W. Zentmyer of Horton. In it the writer proposes that the academic and professional training required by the Association for superintendents and principals be set at a minimum of a master's degree. We quote a portion of his letter:

> Several times during the past year in meetings of fellow school men this question has arisen: Why does not the North Central Association raise the requirements of principals and superintendents in the member schools? We feel that the Association took a very fine step forward a year or so ago in regard to the standards of the class room teacher. We have a number of schools staffed by men with only A. B. degrees and the minimum requirements in Education. Now it seems to us that if the Association can make requirements for the teacher it can also raise the standard for the administrative positions. . . . Personally I should favor a rule requiring that the principals and superintendents of all accredited North Central Association schools have a Master's Degree in Education or work of a graduate rank that would be equivalent.

Would the Association favor this advanced step?

DR. BRUNER'S ARTICLE

The QUARTERLY carries in this issue a reprint of a paper read by Dr. H. B. Bruner before the Conference on Curriculum Re-organization and Revision held at Evanston, Illinois, the last of October. Although this paper deals entirely with curriculum reforms in the elementary schools, it seemed to some members of the N. C. A. Curriculum Committees that teachers and curriculum builders in secondary schools should be familiar, at least in a general way, with what is going on in the field of elementary instruction. It was, therefore, at the request of

some of the workers in the North Central Association's Commission on Unit Courses and Curricula that the paper is published in our magazine.

ACCREDITING PRACTICES

This issue of the QUARTERLY carries Dr. S. P. Capen's vigorous article relating to accrediting practices. Certainly no one in the Association can afford not to peruse it. Dr. Capen confesses himself a critic of the Association and of much for which it stands. The standardizing movement, thinks he, "has warped our very thinking. . . . administered a narcotic to our professional imagination . . . robbed us even of all terminology but its own." He would, if he could, abolish all standardizing agencies forthwith, or, in lieu of this action, he would require all of them to use nothing but "educational standards" instead of what he styles "engineering standards or organization standards or political standards." But read the article in its entirety.

CURRICULUM RECONSTRUCTION

Curriculum reconstruction is apparently going forward in America at a pace never before equalled. Whether it be in elementary schools, secondary schools, colleges or universities the guiding principle is *functional*. A perusal of certain of the articles appearing in this issue of the QUARTERLY must deepen this conviction among readers. Dr. Bruner shows (page 399) that "since 1925 more than 30,000 courses (of study) have been collected in one laboratory alone," while "prior to 1920 fewer than 1500 courses had been published in the United States." Dr. Frasier (page 351) convincingly shows the advantages that have accrued from shifting college admission from specific subjects taken in high school to power tested by means of scientific procedures. Drs. Stout (page 382) and Willett (page 385) reveal, respectively, the attitude of the North Central Association and of certain administrators and pupils in the public schools, while Principal Ryan (page 394) suggests some possible ways of experimenting that offer sure promise in furthering the cause. It will be interesting to note what the next meeting of the Association produces in furtherance of the reform program.

ACTIONS OF THE EXECUTIVE COMMITTEE

At a meeting of the Executive Committee of the North Central Association of Colleges and Secondary Schools which was held November 28, 1931, at the Stevens Hotel, Chicago, Illinois, a number of matters were discussed and actions taken which are of general interest.

The Executive Committee approved rules for the procedure of paying expenditures submitted by Treasurer E. H. Kemper McComb. The approved rules governing the procedure for the expenditure of the money of the Association are as follows:

A budget shall be set up and approved in advance by the Executive Committee.

Money will be paid out only under the budget.

Money will be paid only for any activity that is sponsored by one of the Commissions directly or by a committee reporting to a Commission, whose activity and expense allowance are approved in advance by the Commission.

The treasurer will pay committee expenses when they are presented on the forms of the Association with the approval of the proper official.

Each Committee chairman must approve all expense accounts originating in his committee. Expense accounts for the Commissions must be approved by the secretary of the Commission. Accounts paid in behalf of the QUARTERLY must have the approval of the Editor. Accounts in the Treasurer's office must bear the approval of the Treasurer.

Miscellaneous expense will be paid only when authorized by the Executive Committee, or with the approval of the President between meetings of the Executive Committee.

At this meeting President Edmonson announced the appointment of Dr. George A. Works to succeed Dr. George F. Zook as the Secretary of the Com-

mission on Higher Institutions. The Executive Committee instructed President Edmonson and Dr. Gage to prepare a declaration of the appreciation of the North Central Association for the splendid services rendered by Dr. Zook as Secretary of the Commission on Higher Institutions.

Plans for the improvement in the apperance of the North Central Association QUARTERLY were discussed. This matter will be given further study and consideration.

The Executive Committee voted to express its approval of the report of the Committee on Athletics. It was decided to authorize a meeting of the representatives of the various athletic conferences. This meeting which was well attended by representatives of the various athletic conferences was held in Chicago on January 25, 1932.

The Committee authorized the officers of the Commission on Secondary Schools and the Secretary of the Association to frame a letter emphasizing the desirability of the careful enforcement of Standards and expressing the desires of the Executive Committee to have full information submitted to the Commission on Secondary Schools concerning any serious departure of any school having, or seeking membership in the North Central Association. In accordance with the instructions of the Executive Committee the letter which follows has been sent to all members of the State Committees and all members of the Executive Committee:

At a meeting of the Executive Committee of the Association on November 28, 1931, very careful consideration was given to the advisability of liberalizing the standards of the Association during the present period of financial depression. It was, however, unanimously agreed that it is highly desirable under present circumstances that the schools should be urged to make every possible effort to comply with the standards as they are now formulated. It was further agreed that State Committees should be especially careful in observing the distinctions which the Association makes between its "Standards" and its "Recommendations." A warning can be issued only in case a "Standard" is being violated.

It should be kept clearly in mind that the Standards of the North Central Association are minimum standards.

Secondary schools on the accredited list should very definitely understand that there will be no disposition on the part of the Association to proceed in an unduly arbitrary manner. All meritorious cases should be given individual consideration. In all deficiency cases, which appear to merit special consideration, authorities should be requested to submit complete data concerning the nature, cause, and probable duration of such deficiencies.

The policies and practices of the Commission on Secondary Schools relative to the making of standards were discussed with a view to the final adoption of a different policy governing the making of standards for secondary schools. There has been a rather general feeling that standards have been changed too frequently and in some instances without giving the authorities in charge of the secondary schools sufficient notice in advance of the time when such standards would become effective. There was also a feeling that any tendency for the North Central Association to become too detailed in its requirements as set forth in the "Policies, Regulations and Standards for the Accrediting of Secondary Schools" should be avoided. It was pointed out that in order to be eligible for membership in the North Central Association a secondary school must be in the highest list of schools as officially listed by the properly constituted educational authorities of the state. This means that many of the details pertaining to the accrediting of high schools have already been taken care of by those charged with the responsibility of the inspection and accrediting high schools within the state.

Mr. McWhorter, Chairman of the Commission on Secondary Schools, was authorized to call a meeting of the State Chairmen for Sunday evening, March

3, and Monday, March 14, 1932, to iscuss the interpretation of Standards, o consider matters of interest to the State Committees and to determine the plans to be used by the Commission in examining the annual reports for the purpose of determining the list of schools to be accredited.

The Executive Committee realizes the serious loss to the Association in the death of Professor Horace A. Hollister, University of Illinois, and Professor Thomas Lloyd-Jones, University of Wisconsin. The Secretary was instructed to write to their bereaved families.

It was voted by the Committee to refer to the Commission on Secondary Schools Professor Downing's proposal of having units in science, without laboratory work and taught by demonstration only, accepted for college entrance.

Dean J. B. Edmonson, President of the Association, announced that Mr. E. H. K. McComb had been appointed to represent the North Central Association at the meeting of the New England Association of Colleges and Secondary Schools and that Mr. B. L. Stradley, Examiner of the Ohio State University, had been appointed to represent the North Central Association at the meeting of the Association of Colleges and Secondary Schools of the Middle States and Maryland. Dean Edmonson was authorized to represent the North Central Association at the meeting of the Association of Colleges and Secondary Schools of the Southern States.

The Secretary was authorized to send letters to the State Chairmen regarding the desirabilty of extending the list of readers of the North Central Association QUARTERLY. It was felt that much has been published and is being published in the QUARTERLY that would be of great value to classroom teachers.

Professor C. O. Davis, University of Michigan, was instructed to prepare a bulletin giving the history, organization and advantages of membership in the Association. It was felt that such a bulletin would help to prepare for a wider distribution of the publications of the North Central Association.

The Secretary was instructed to make the necessary arrangements for handling the news of the next annual meeting in March, 1932. The services of Mr. John B. Stone have been secured for this purpose. All publicity will be handled at the time of the annual meeting in the Secretary's office.

It was decided to announce March 16, 17, 18, 1932 as the dates for the annual meeting of the Association. In former years there has been a tendency for many who are not officially connected with the Association and not on special committees to arrive too early for the purpose of attending the general meetings of the Association.

PROFESSOR THOMAS LLOYD-JONES
UNIVERSITY OF WISCONSIN

The North Central Association of Colleges and Secondary Schools feels deeply the loss of Professor Thomas Lloyd-Jones who died on September 3, 1931.

Professor Jones served as Chairman of the North Central Association for Wisconsin. His energy, honesty, and high ethical standards soon made him an influential figure in the Annual Meetings of the Association in Chicago. The present policies and practices of the North Central Association have been markedly influenced by him.

The following Memorial Resolution on the Death on September third of Professor Thomas Lloyd-Jones has been presented to the University of Wisconsin by a committee composed of Professor F. L. Clapp, Professor A. W. Hopkins, and Professor C. A. Smith.

"From the time the Lloyd-Jones family settled in Wyoming valley, Iowa county, Wisconsin, to the present, it has con-

tributed generously to the cultural and educational leadership, not only of the surrounding countryside but as well to the state and even to that of other states. Born at Hillside, on December 19, 1870, Thomas Lloyd-Jones spent his boyhood in this beautiful valley learning much from nature and gaining much from the stimulating influence of those educational pioneers who created and carried on the nearby and noted Hillside school.

He continued to build into himself Wisconsin tradition and to fit himself for service by attending the University of Wisconsin from which he was graduated in 1896. For a period of years he returned to Hillside school giving back the inspiration and leadership which it had given him. In turn he served the school communities of Hartford, Menomonie, Wauwatose, Fond du Lac, and Madison. In each place he left behind him abundant evidences of intellectual leadership, together with a host of loyal friends who with the advance of years have realized more and more the influence among them of this radiating and molding force.

From local secondary school service he stepped to the state field in 1914 when he became University High School Visitor and part-time Secretary of the University of Wisconsin Alumni Association. While he carried the responsibility of the latter position but a year, in that time he helped greatly to point out how the University might continue to serve its former students.

Since 1915, Professor Jones devoted his entire time to the service of the high schools and the University. In this post, important alike to the secondary schools and to the University, he proved to be an educational statesman, interested in retaining and developing the highest cultural values, in reconciling differences and controversies which would impede the cause of education and limit the influences of the disputants, and in adding to the richness of individual and community life. Having the gentle touch of the artist, it was but natural that his influence upon the high schools of the state should have added to every community something of his appreciation of the beautiful.

As would be expected his educational statesmanship was recognized outside as well as within the state and his fellows in the North Central Association repeatedly called upon him for leadership.

True to the spirit of his people and expressive of his early environment, Professor Jones was ever of the most democratic nature. Being a disciple of simple living, he found his greatest enjoyment and fullest inspiration away from the artificial and outside the boundaries of the highly commercial.

It was only natural that a sensitive nature like his ever should have thrown its influence upon the side of social and economic justice. For wide as were his interests in education, they extended back to the material and spiritual well being of the family, the community and the state which to him was one of the prime purposes of education.

Many of the things we have already said of Thomas Lloyd-Jones have had to do with his professional activities in none of which he was found wanting. He sought to repay society and the state for what he had received. The ledger is more than balanced. As a man he was friendly, kindly, intelligent, and inspiring."

PROFESSOR HORACE A. HOLLISTER
UNIVERSITY OF ILLINOIS

In the death of Professor Horace A. Hollister which occurred on July 26, 1931, the North Central Association of Colleges and Secondary Schools recognizes and keenly regrets the loss of a man who for more than a quarter of a century was an outstanding leader in the development of secondary education, a

man whose influence was felt and whose counsels were sought not only in Illinois but throughout the nation. He was quick to recognize the various problems of education, particularly those of secondary schools, and brought to their solution a soundness of judgment and tactful initiative that accomplished much toward the continued improvement of secondary education. He was also actively engaged in the development of higher education and through his relationship with the North Central Association and with the University of Illinois contributed much toward the solution of many of the problems of colleges and universities.

Professor Hollister was one of the men who organized the North Central Association of Colleges and Secondary Schools. He was present at the first meeting of the Association. In the early history of the Association he was very active in helping to develop its policies and to determine the scope of its work. He was the Chairman of the State Committee on Secondary Schools for Illinois and not only represented the high schools of Illinois at the meetings of the Association, but frequently represented the State University. He remained active in the work of the North Central Association until the time of his retirement from the University of Illinois in 1928. With the Association, Professor Hollister has served in many official capacities. He had a large share in the development of the policies, regulations and standards for the accrediting of secondary schools. His influence on the Association has been very marked and his services will be long remembered.

Professor Hollister was born in Manchester, Iowa, on October 14, 1857. He was educated at the University of Iowa and in 1888 received an advanced degree from that institution. If one should turn the pages of *Who's Who in America* he would find after the name of Professor Horace A. Hollister a long list of achievements in which any one might well take pride. But how inadequate are such data in expressing the far-reaching influences of Professor Hollister! Those intangible things which spring from high ideals, a genuine sense of justice, and a kindliness toward his fellow men cannot be measured through a mere tabulation of such data.

He was author of several books and a great many bulletins and magazine articles. His book, *The High School,* was one of the first books of its kind on the administration of secondary education and for a great many years was widely used as a textbook in school administration.

For more than a quarter of a century Professor Hollister was the High School Visitor of the University of Illinois. The rapid growth of the secondary schools and the increase in expenditures brought many problems to the office of the High School Visitor, but he met all of those problems with a seasoned and balanced judgment, and with a faithfulness and clearness of vision which showed his mastery of the technique of administration and of the details so essential to the proper conduct of a modern high school. In such enterprises as the Illinois High Conference, which Professor Hollister projected and established, and then conducted wisely and skillfully through its many years of phenomenal growth and development, he exerted an especially powerful and beneficent influence upon the educational system of Illinois. Those who knew him will always remember his unswerving fidelity to fine and high ideals, his keen sense of justice, his kindliness toward his fellow men and his consideration of them. His untiring devotion and his unpublished and profound sacrifices in behalf of those things which are most excellent will endure in the memories of us with whom he lived and labored.

A. W. C.

N. C. A. Officials, 1915-1932

Below are given, in alphabetical order, the names of all individuals who have served as general officers of the Association during the past seventeen years (1915-1932 inclusive), together with the particular positions which they have occupied and the dates of their incumbencies. The abbreviation (other than ones in common usage) represent the following: Ex. C.—Executive Committee; Com. H. I.—Commission on Higher Institutions; Com. S. S.—Commission on Secondary Schools; Com. U. C. & C.—Commission on Unit Courses and Curricula.—The Editor.

I. M. Allen, 2nd V. P. 1918-1919

H. J. Alvis, Ex. C 1920-21

J. E. Armstrong, Ex. C. 1915-16

K. C. Babcock, Secy. Com. H. I. 1916-25; Ex. C. 1923-24; Ex. C. 1927-28

H. M. Barrett, Ex. C. 1919-20

F. L. Bliss, Ex. C. 1918-19

H. H. Bone, Ex. C. 1919-20

C. S. Boucher, V. Chm. Com. H. I. 1928-

W. W. Boyd, Pres. 1927-28; Ex. C. 1927-29

C. C. Brown, Secy. Com. S. S. 1927-30

H. E. Brown, Secy. 1915-19; Ex. C. 1915-19

W. J. S. Bryan, Ex. C. 1915-16; Ex. C. 1925-26

B. F. Buck, 1st V. P. 1917-18

George Buck, Pres. 1918-19; Ex. C. 1918-20

G. N. Carman, Ex. C. 1916-17; Ch. Com. H. I. 1915-16

R. E. Carter, Ex. C. 1918-19

C. E. Chadsey, Ex. C. 1922-24; 1st V. P. 1924-25

W. W. Charters, 1st V. P. 1918-19; Ch. Com. U. C. & C. 1919-20; Ex. C. 1919-20

H. G. Childs, Secy. Com. S. S. 1925-27; 2nd V. P. 1926-27

H. V. Church, Secy. Com. U. C. & C. 1919-20

Thomas A. Clark, Pres. 1915-16; Ex. C. 1915-17

A. W. Clevenger, Secy 1930-; Ex. Com. 1930-

L. D. Coffman, 1st V. P. 1920-21; Pres. 1921-22; Ex. C. 1921-23

C. N. Cole, Ex. C. 1919-20

C. B. Curtis, Pres. 1916-17; Ex. C. 1916-17

C. O. Davis, Secy. Com. S. S. 1915-25; Ex. C. 1920-21; Editor QUARTERLY 1926-

T. M. Deam, Secy. Com. U. C. & C. 1920-28; Ch. Com. U. C. & C. 1928-; Ex. Com. 1928-

J. V. Denney, Ex. C. 1915-16

W. I. Early, 1st V. P. 1921-22; Ex. C. 1922-30; Treas. 1922-28; Pres. 1928-29

J. B. Edmonson, Secy. 1925-31; Ex. C. 1925-31; Pres. 1931-

J. D. Elliff, Ch. Com. S. S. 1915-18; Ex. C. 1916-18, 1926-28; 2nd V. P. 1921-22; 1st V. P. 1922-23; Pres. 1926-27

E. C. Elliott, Ex. C. 1925-28; Ch. Com. H. I. 1925-28

J. P. Everett, Ex. C. 1926-27

David Felmley, 1st V. P. 1915-16

G. W. Frasier, 2nd V. P. 1931-

H. M. Gage, Secy. 1919-25; Ex. C. 1919-; Pres. 1925-26; Ch. Com. H. I. 1928-

J. T. Giles, 1st V. P. 1931-

T. W. Gosling, 1st V. P. 1926-27; Ex. C. 1929-31

M. E. Haggerty, Ex. C. 1928-32

J. C. Hanna, 1st V. P. 1919-20; Ex. C. 1923-25

C. E. Hinshaw, Ex. C. 1921-23

T. F. Holgate, 1st V. P. 1916-17; Pres. 1917-18; Ex. C. 1917-18.

H. G. Hotz, 1st V. P. 1929-30; Secy. Com. S. S. 1930-
R. M. Hughes, Secy. Com. H. I. 1925-26; V. Ch. Com. H. I. 1926-28; Ex. C. 1925-27
W. A. Jessup, Ex. C. 1921-23
C. H. Johnston, Ch. Com. U. C. & C. 1916-18; Ex. C. 1917-18
T. L. Jones, Ex. C. 1926-28; Ch. Com. S. S. 1926-28
C. H. Judd, Sec. Com. H. I. 1915-16; Ch. Com. H. I. 1916-25; Ex. C. 1916-25; Pres. 1923-24
C. H. Lake, Ex. Com. 1931-
F. C. Landsittel, Ex. C. 1924-26, 28-30; Ch. Com. S. S. 1928-30
E. H. Lindley, 2nd V. P. 1927-28
L. C. Lord, Ex. C. 1919-20
E. D. Lyon, Ex. C. 1917-18
E. H. K. McComb, Ex. C. 1927-; Treas. 1928-
J. L. McConaughey, Ex. C. 1921-23
J. S. McCowan, 2nd V. P. 1920-21
E. D. McElroy, Ex. C. 1924-26; Ch. Com. S. S. 1924-26
G. L. Mackintosh, Pres. 1919-20; Ex. C. 1919-21
T. H. McMichael, Ex. C. 1920-21
L. N. McWhorter, Ch. Com. S. S. 1930-; Ex. C. 1930-
J. H. T. Main, Ex. C. 1916-17
G. E. Marshall, Ex. C. 1917-18; Pres. 1920-21; Ex. C. 1920-22
J. G. Masters, Ex. C. 1918-19; Ex. C. 1921-23
C. R. Maxwell, 1st V. P. 1930-31
E. L. Miller, Ex. C. 1916-17, 1924-26; 2nd V. P. 1922-23; Pres. 1924-25
H. L. Miller, 1st V. P. 1926-27
A. R. Miller, Ex. C. 1923-24
E. W. Montgomery, 2nd V. P. 1929-30
W. P. Morgan, 1st V. P. 1923-24; Ex. C. 1928-31; Pres. 1929-30
A. O. Neal, 1st V. P. 1925-26
J. H. Newlon, Ex. C. 1918-19; Ch. Com. U. C. & C. 1918-19
J. S. Nollen, Ex. C. 1916-17; 2nd V. P. 1924-25
C. H. Perrine, Ex. C. 1927-29
E. M. Phillips, Ex. C. 1922-24, 1925-26; Ch. Com. S. S. 1922-24
F. G. Pickell; Ex. C. 1920-24; Ch. Com. U. C. & C. 1920-24; 2nd V. P. 1923-24
Samuel Plantz, Ex. C. 1924-25
Merle Prunty, 2nd V. P. 1925-26; Ex. C. 1928-; Pres. 1930-31
A. A. Reed, Ex. C. 1918-22; Ch. Com. S. S. 1918-22
C. K. Reiff, Ex. C. 1924-25
H. O. Rugg, Ex. C. 1918-19
Ellen F. Sabin, Ex. C. 1917-18
F. N. Scott, Ex. C. 1915-16; Ex. C. 1917-18
H. H. Seerley, 2nd V. P. 1916-17; 2nd V. P. 1919-20
W. F. Shirley, Ex. C. 1920-21
L. W. Smith, Ex. C. 1924-29, Ch. Com. U. C. & C. 1924-29
S. R. Smith, V. Ch. Com. H. I. 1915-17
W. E. Smyser, Ex. C. 1916-17, 1st V. P. 1928-29
M. H. Stuart, Treas. 1915-22; Ex. C. 1915-24; Pres. 1922-23; Ex. C. 1926-27
C. F. Thwing, 2nd V. P. 1915-16
W. E. Tower, Ex. C. 1929-30
L. W. Webb, 2nd V. P. 1928-29
Dora Wells, Ex. C. 1923-24
G. W. Willett, 2nd V. P. 1930-31
J. M. Wood, Ex. C. 1930-31
G. A. Works, Secy. Com. H. I. 1931-
O. O. Young, Ex. C. 1926-27
G. F. Zook, Secy. Com. H. I. 1926-31

Preliminary Program

Thirty-Seventh Annual Meeting

of the

North Central Association of Colleges and Secondary Schools

Wednesday, Thursday, and Friday

March 16, 17, 18, 1932

Chicago, Illinois

Headquarters: Stevens Hotel

The three Commissions of the Association will have programs on Wednesday morning and afternoon and Thursday morning. The general sessions of the Association will be held Thursday afternoon, Friday morning, and Friday afternoon. The annual banquet will be held Thursday evening.

PROGRAMS OF THE COMMISSIONS

Wednesday, March 16

9:00 A. M. Commission on Institutions of Higher Education

1. Roll Call.
2. Outline of Program and Procedure. The Chairman.
3. Report of the Secretary of the Commission.
4. Reports of Special Committees of the Commission (presented by the chairmen):
   - *a.* Committee on Music and Art Schools. A. H. Upham, President of Miami University.
   - *b.* Committee on Junior College Accrediting. L. V. Koos, Professor of Education, University of Chicago.
   - *c.* Reports of Committees in charge of supervising various experiments approved by the Commission. (Presented by the chairmen):
     - (1) Iowa State Teachers College. V. A. C. Henmon, Professor of Education, University of Wisconsin.
     - (2) Joliet Junior College. Thomas E. Benner, Dean of the College of Education, University of Illinois.
     - (3) Junior College of Kansas City. Charles H. Judd, Director of the School of Education, University of Chicago.
     - (4) University of Tulsa. J. D. Elliff, Professor of Education, University of Missouri.

(5) Stephens College. Charles H. Judd, Director of the School of Education, University of Chicago.
(6) Cornell College. Floyd W. Reeves, Professor of Education, University of Chicago.

5. Address. (Speaker to be selected).

9:00 A. M. Commission on Secondary Schools

1. Final reading of school lists and action by the Commission.
2. The report of the Secretary and of routine committees.
3. Report of the Committee on Athletics. E. E. Morley, *Chairman,* Principal of High School, Cleveland Heights, Ohio.
4. Report of the Committee on Library. E. L. Miller, *Chairman,* Assistant Superintendent of Schools, Detroit, Michigan.
5. Report of the Committee on Nominations and Election of Officers.

9:00 A. M. Commission on Unit Courses and Curricula

1. Roll Call and Reading of the Minutes of the last meeting. The Secretary.
2. Outline of the Work of the Commission. The Chairman.
3. Report of the Committee on College Entrance Requirements in English. E. L. Miller, Assistant Superintendent of Schools, Detroit, Michigan.
4. Report of the Committee on Survey of Trends in Curriculum Revision in North Central Schools. G. W. Willett, Superintendent of Lyons Township High School and Junior College, La Grange, Illinois.
5. Consideration of the Membership and Officers of the Commission for Next Year.

2:00 P. M. Commission on Institutions of Higher Education

1. Roll Call.
2. Report of the Board of Review. George A. Works, Secretary.
3. Recommendation to the Executive Committee of the Association of Institutions to be Accredited.
4. Reports of Special Committees of the Commission (*Continued*):
   d. Committee on Physical Education and Athletics. Chairman H. M. Gage, President of Coe College.
5. Address. (Speaker to be selected).

2:00 P. M. Commission on Secondary Schools

1. Report of the Committee on the study of university practices in relation to the credits received from three-year senior high schools. A. A. Reed, *Chairman,* University Examiner, University of Nebraska.
2. Reports of progress of the Committee on the Tulsa, Oklahoma, High School Educational Experiment. H. E. Chandler, University of Kansas, representing the Commission on Secondary Schools.

1:30 P. M.—Commission on Unit Courses and Curricula

1. Report of the Committee on Standards for Use in the Reorganization of Secondary School Curricula. L. W. Webb, Professor of Education, Northwestern University.
   a. Report of the Sub-Committee in Art. W. G. Whitford, Professor of Art Education, University of Chicago.
   b. Report of the Sub-Committee in Mathematics. Raleigh Schorling, Professor of Education, University of Michigan.
   c. Report of the Sub-Committee on an Experiment in the Preparation of High School Pupils for College. H. H. Ryan, Principal of Wisconsin High School, University of Wisconsin.
   d. Report of the Sub-Committee on Developing Teaching Units of Materials of Instruction Organized in Terms of Functional Objectives. Will French, Associate Superintendent of Schools, Tulsa, Oklahoma.
2. Discussion. "What Should Be the Policy Governing the Future Activities of the Commission?" The Chairman of the Commission.
3. Report of the Nominating Committee of the Commission.

THURSDAY, MARCH 17

9:00 A. M. Commission on Institutions of Higher Education

1. Roll Call.
2. Election of Officers.
3. Report of the Committee on Revision of Standards. L. D. Coffman, *Chairman*, President of the University of Minnesota.
4. Reports of the Committee in Charge of the Study.
   President George F. Zook, University of Akron
   Dean M. E. Haggerty, University of Minnesota
   Dr. Floyd W. Reeves, University of Chicago.

9:00 A. M. Joint Meeting, Commission on Unit Courses and Curricula and Commission on Secondary Schools

Presiding Officer: L. N. McWhorter, Assistant Superintendent of Schools, Minneapolis, Minnesota.

1. The Work of the National Survey Committee on Secondary Education. A. K. Loomis, Principal, University High School, University of Chicago.
2. Discussion. Led by Will French, Associate Superintendent of Schools, Tulsa, Oklahoma.

NOTE: It is expected that the joint session will adjourn at 11:00 o'clock, after which time the two Commissions will return to their respective rooms for a final business meeting.

PROGRAM OF THE GENERAL ASSOCIATION

Presiding Officer: J. B. Edmonson, Dean of the School of Education, University of Michigan.

THURSDAY, MARCH 17

1:45 P. M. Program in Charge of the Commission on Unit Courses and Curricula

1. The Work of the Committees of the Commission on Unit Courses and Curricula. The Chairman of the Commission.
2. What Revisions of Curricula are North Central Schools Making? G. W. Willett, Superintendent of the Lyons Township High School and Junior College, La Grange, Illinois.
3. Art Education: Types of Teaching Material that Might Be Included in the Curricula of Our Secondary Schools. W. G. Whitford, Professor of Art Education, University of Chicago.
4. Address—Dr. G. W. Rightmire, President of the Ohio State University.

3:30 P. M. Business Meeting

5. Appointment of Committees. Mr. Edmonson (President).
6. Report of the Nominating Committee.
   J. B. Shouse, Dean of Marshall College
   F. L. Hunt, Culver Military Academy
   H. N. Crooks, President of Alma College
   C. C. Schmidt, Professor of Education, University of North Dakota
   H. M. Thrasher, *Chairman*, State High School Supervisor, Springfield, Illinois.
7. Report of the Executive Committee. Mr. Clevenger (Secretary).
8. Report of the Treasurer. Mr. McComb.

6:00 P. M. Banquet

1. Greetings from Fraternal Delegates from Other Regional Standardizing Agencies.
2. Address—J. B. Edmonson, President of the North Central Association of Colleges and Secondary Schools.
3. Address—Dr. H. W. Chase, President of the University of Illinois.

FRIDAY, MARCH 18

9:00 A. M. Program in Charge of the Commission on Secondary Schools

1. Report of Business Transacted by the Commission. H. G. Hotz, Secretary.

10:30 A. M.

2. Address—Dr. A. G. Ruthven, President of the University of Michigan.
3. Committee on Time and Place.
4. Election of Officers.

2:00 P. M. Program in Charge of the Commission on Institutions of Higher Education

1. Report of the Commission on Institutions of Higher Education. George A. Works, Secretary.
2. Report of Delegate to the American Council on Education.
3. Address—

The Principles Which Should Govern Standards and Accrediting Practices[1]

S. P. Capen
Chancellor, University of Buffalo
Buffalo, N. Y.

History is said to have a habit of repeating itself. Generally the same individuals are not present to witness the repetition. A repetition is now about to take place, however, in which many of the actors *are* the same.

The last time I had the honor of appearing before the North Central Association was seventeen years ago. The topic assigned me was essentially the topic now appearing on the program opposite my name — although I can no longer remember the exact wording. The motive for inviting me I judge to have been substantially the same in both instances. I was, and am, supposed to be identified with a practice or a point of view not altogether in good order with members of the Association. I appeared then, and now appear, as an apologist, or solecist, or devil's advocate. (It is an unhappy role, and, appearances to the contrary notwithstanding, I assure you, it is not chronic).

But history is not only repeating itself, it has also been making itself in the interval. The Association does not stand where it stood seventeen years ago. The views of all of us who were here then have changed. Colleges have changed. To a certain extent the methods of all higher institutions have changed. To a greater extent the philosophy of higher education has changed. And this is not strange because the world has changed, changed more radically than in any other seventeen years since man began to leave a record of his accomplishments.

These are very trite observations. I would not bore you with them except for one reason. It is this. Although we may recognize past changes, we sometimes ignore the fact that the process of change is going to continue; and we legislate for the future as if the conditions of the present hour were to persist. I should like therefore, to posit as the underlying assumption for all I shall have to say the factor of continued and rapid change. I believe, and I think I could prove it if I had the time, that during the academic year 1930-31 more significant reforms affecting the conduct of collegiate education have been made in more institutions than have ever been made in a single year before, except perhaps during the time when the elective system swept the country like an epidemic. I anticipate that this record will shortly be surpassed; if not in the year 1931-32, then in some year within the next five. Why? Because colleges have not yet adjusted themselves to this new American life. Because they probably never will quite catch up with it in any period that we can now foresee. Because, thank heaven! theory continues to outrun practice. Because we are still a long way from putting into effect the theory that most of us have come to hold. And because by the time this theory has been generally translated into practice we shall be holding another theory growing out of new conditions.

There are three principal causes for the lag of practice behind theory. The first is the natural indolence which educators share with the rest of the human

[1] An address delivered before the Commission on Institutions of Higher Education, at the Chicago meeting, March, 1931.—The Editor.

race; the polite name for it, of course, is academic conservatism—a very handsome and complimentary label. The second cause is lack of money, a disease with which even the most prosperous institutions are afflicted. And the third is law. I shall have nothing to say about the first two causes. This paper is devoted to some aspects of the third.

A standard is a law. It may be enacted and enforced by an extra-legal agency. In the United States that is generally the case. Most of the really powerful standardizing agencies are voluntary associations. No authority is delegated to them by the state to coerce any individual or institution. Nevertheless, the power that they exercise is comparable to the power of the government in these countries which have governmentally administered systems of education. It actually exceeds the power exercised over secondary and higher institutions by the great majority of state governments in the United States. The instruments the standardizing agencies use are the simplest imaginable: printed standards and printed lists, two little scraps of paper. But in them reside life and death. No institution can fall short of the prescriptions of the standard and continue to flourish. In certain fields of higher education no institution can even survive if it fails of inclusion in the list. That is what I mean when I say a standard is a law, the most inexorable law to which any educational institution is subject.

Goethe once had remarks to make about law. He put the remarks into the mouth of the devil. Perhaps, in view of the role for which I seem to be cast in this discussion, it may be appropriate for me to quote them.

> "Laws everywhere are like the taint
> Of an inherited complaint,
> The curse of an infected race:
> Their downward progress you may trace,
> From land to land, through blighted nations,
> Afflicting distant generations—
> Reason made nonsense, good intent,
> In lapse of time warped from its true sense,
> Things for the common welfare meant,
> Becoming thus a common nuisance."

The statement contains possibly a trace of diabolical hyperbole. But which of us will deny that, as far as statute law is concerned, it is substantially correct?

A standard is a law. And it generally has the same purpose as the majority of laws; namely, to prevent misdemeanors. This is a praiseworthy purpose. Misdemeanors must often be prevented for the sake of the common welfare. The standardizing movement is some twenty-five years old. When it began there were literally hundreds of institutions, colleges, academies, medical schools, law schools and dental schools that were selling to the public—often at considerable profit to their backers—educational gold bricks. Sometimes the fraud was deliberate, sometimes it was committed innocently by ignorant people. Either way it was a serious misdemeanor, tragically harmful to youthful patrons who did not know until too late that they were being cheated. Standardizing was devised primarily to put a stop to this abuse. In fulfilling this purpose it has been almost 100% successful. No such brilliant success has ever attended any other movement in American education.

But laws have another purpose, particularly in these United States, and that is to make the rest of humanity over according to a pattern that is pleasing to the law-giver. The law-giver frequently rationalizes his motive until it looks like a kind of exalted civic altruism. But is is just meddlesomeness. We are an incorrigibly meddlesome people. Minding somebody else's business has an irresistible attraction for us. And we abhor non-conformity.

No one would suppose that the edu-

ational profession, the profession that in daily and hourly contact with the nfinite variety of human nature, the rofession that is committed to fostering ne development of the individual in accordance with his gifts, would be immune from this national vice, that it would resist vigorously all efforts to mould its practices to a single pattern. One would suppose it would be the last profession to succumb to mechanization. But, alas, no! For twenty-five years the profession has been busy building up machinery, automatic machinery that relieves it as far as possible of the arduous task of weighing human capacities and accomplishments, machinery that measures education by the linear yard and the time-clock and the price of school paraphernalia, machinery designed to make institutions as much alike internally as Ford cars—allowing for individual variation only in the color of the finish. How does this machinery get itself manufactured? The profession delegates the job to the standardizing agencies. The standardizing agencies make laws and the thing is done.

An interesting characteristic of laws is that they must be enforced literally. Concessions cannot be made, or nullification ensues. That seems to us very reasonable in the case of theft. It is just as wicked to steal $10 as to steal $100,000—although, of course, the penalty for the latter offense is greater. But how about it in the case of the law governing institutional endowment? Is it just as wicked to have $490,000 as to have only $147,000? $490,000 is not $500,000 and the law says that nothing less than $500,000 is a guarantee of virtue. Or how if an institution, for reasons that seemed to it educationally sound, should require but 118 semester hours for graduation, (Harvard requires only 105). Does not the law demand that the extreme penalty be visited upon it? And there must be but one law for the great and the humble.

This Association was one of the pioneers of the standardizing movement. It has had a notable record. It has taken great care in the formulation of its standards. Its law-givers have allowed all possible latitude in the interpretation of its laws. They have even tempered justice with mercy, occasionally, I believe, in defiance of the law. The Association has also been ready to amend when amendment has been shown to be desirable. Its career as a standardizing body has been truly constructive. Through its operations secondary and collegiate education in the vast territory that it covers have been stimulated and improved. No one could gainsay that the stimulation and improvement have been much more rapid and extensive than would have been the case if the Association had dealt in pious resolutions only, instead of in mandates.

But admitting all this, and more that might easily be added, I venture to come before you as a critic of your past and an opponent of your present. The very excellence of the North Central Association and its high-mindedness are the most unfortunate of its qualities. By virtue of these qualities it has contributed more than has any other agency to make standardizing respectable, perhaps to render it impregnable. And when I contemplate that prospect my heart sinks within me.

No doubt the reasons for my depression have already been implied. But let us look beyond the range of your own operations for a moment. Great as the North Central Association is, powerful as it is and influential, it yet touches but a small segment of higher education. But the standardizing activities of state, regional, and national bodies now reach out and practically envelop higher education. A college of liberal arts in your territory is amenable to your laws only and the burden may be relatively easy to bear. A university in your territory

or anywhere else is hedged about by standards set up by at least half a dozen different agencies, each designed to serve a special professional interest, each serenely indifferent to problems of institutional budget and educational balance, each aiming to enforce uniformity of practice and requirement within its limited sphere. Moreover, every standard is couched in the same general terms, in terms of hours of credits, of degrees, of dollars, of *things*. Each standard assumes that the imponderable can be weighed by the pound. And this preposterous metric system once established quickly freezes into immutability. The law is the law. It must have been right, else it would not have become the law. If it was right, there must inhere in it an invariable quality of rightness.

I promised not to say anything about academic conservatism, but I think I will break the promise. In my professional lifetime I have witnessed two successive exhibitions of academic conservatism on a nation-wide scale. The first was represented by the almost unanimous commitment of the profession to the defense of the ancient fixed curriculum and its attendant theory of mental discipline. The second is represented by the total surrender of the profession to the credit system, the offspring of the standardizing movement. If you think the phrase "total surrender" is too harsh, I ask you to indulge in introspection for a moment. How do you set about describing—*to yourself,* let alone to others—a proposed change in curriculum? How would you formulate a new requirement for a degree or certificate? How do you define any student's accomplishment at any level from the elementary grades through the graduate school? How can you gain a mental concept of the offerings of any institution? These are not rhetorical questions, but the answer to each is the same and we should all be embarrassed if I pronounced it above a whisper. But I wi ask another that is still more embarras ing. Did you not feel a sense of utt bewilderment and insecurity, as if th world had suddenly become four-dime sional, when you read of the new edu cational plan of the University of Ch cago? What had become of the sacre semester hour "or its equivalent in ter hours, quarter hours, points, majors c courses"?

And here after all lies my main griev ance. If the standardizing movemen had only placed upon institutions arb trary external restrictions, howeve hampering, it would not have been s disastrous. These can be combatted c outwitted. But it has warped our ver thinking. It has administered a narcoti to our professional imagination. It ha robbed us even of all terminology bu its own. Before we can again turn ou minds to the substance of education and away from the mould, we mus grope for a new language. And this i a time when nearly everything we d in secondary and higher education is ac mittedly more or less obsolete, when th adjustment of our institutions to changed social environment is impera tive, when educational science is becom ing increasingly prolific of new measure of human capacity and accomplishmen when innovation and experiment ar needed as never before!

But perhaps you are wondering wha this has to do with the subject assigne to me for discussion. The subject, yo will recall, is "The Principles whic should Govern Standards and Accredit ing Practices." I should like now t break the subject in two and deal wit the last part of it first. What principle should govern accrediting practices? M answer is no principles. I believe ther should no longer be any accreditin practices. If tomorrow morning ever accrediting committee in the countr should adjourn *sine die* and every ac

edited list should be destroyed, I be-
ve American Education would receive
ch a stimulus as it has not received in
dozen years. There has been but one
stification for accrediting and that is
ducational malpractice, deliberate or
nconscious. I do not say that this has
ntirely disappeared. But I do maintain
at it has been so greatly reduced as to
quire no such elaborate and costly—
s, and tyrannical — machinery as the
isting accrediting system to keep it
nder control. The pirates and bucca-
eers have been swept from the seas.
takes no very ponderous armament to
al with an occasional picaroon.

Because I am not quite a nihilist I
ave a substitute for current accrediting
ractices to propose. I propose that
very regional and national body now
ngaged in accrediting establish in place
f its accrediting machinery a sanitary
ommission. The function of such a
ommission would be to investigate any
stitution thought to be unsound or dis-
onest and give the findings wide pub-
city. As a corrective of errors or a
eterrent to fraud such a procedure
ould be quite as efficacious as the pres-
nt accrediting procedure. Does anyone
oubt that it would be far less expens-
e in time and money? But much more
mportant than any matter of cost would
e the general relief from the deadly
echanical coercion of the type of stand-
rds on which accrediting is now based.

Sometimes I am moved to discour-
ging reflections on reform. No one
ould deny that all the major reforms
n education have demanded prodigious
nergy and devotion. And the reformers
elieve that each gain must be consoli-
ated and as far as possible made per-
manent. But the time always comes—
nd generally right soon—when today's
eform must be undone because it blocks
he road for tomorrow's reform. When
oday's reform has really been consoli-
ated and made permanent, however, the normal difficulty of bringing about a change is tremendously increased. Then there is a system to undo. To undo a system is incalculably more difficult than to create one. There are interests, operating personnel, esprit de corps, just pride of accomplishment, money investment, familiar habit to buttress the system. By way of illustration I invite your attention to a field outside your own, the field of medical education. A great reform, one of the greatest we have ever witnessed, took place in medical education some twenty years ago. It was the product of holy zeal. And in order to make sure of it, its authors entrenched it behind regulations and laws and air-tight enforcing devices. How long was it a useful dispensation? Certainly not fifteen years, probably not more than ten. At all events it has been apparent for some time that the reform which saved medical education is in a fair way to destroy it again, unless it is superseded by a new reform. But there is the system painstakingly perfected, functioning with extraordinary efficiency, extraordinarily resistant to assault. Can the great reform of medical education be reformed in its turn? Eventually, of course. Some progress has already been made in that direction. But just because the first reform was established as if it were something fixed and final its subsequent modification has been dishearteningly slow.

I am under no illusions, therefore, as to the prospect of the early abandonment of the accrediting system, your own or any other; even assuming that my views should be shared by some of your leaders—and of that I have no assurance. But that you are not complacent about your practices is proved by the studies of Professor Reeves and others, and by the appointment of the Committee on the Revision of Standards which has lately received a substan-

tial grant for its investigations. For one who holds opinions as unorthodox as mine these are most encouraging and significant developments. They raise once more the question: What are valid standards? They raise it not alone for your own membership, but because of the record and the influence of the North Central Association, they raise the question for the whole country. That is the question embodied in the first part of the topic assigned to me in this discussion. Let me therefore return to it for a moment in closing.

With what are educational standards concerned? They are concerned with the intellectual achievement of individuals. *Educational* standards are concerned with nothing else. They do not involve time; or space, however luxuriously or meagerly enclosed and encumbered; or money; or mass; or number; or organization. They involve simply the results of the stimulation, the effort and the growth of individuals. Educational standards are measures of different levels of capacity to do something, something predominantly intellectual. They measure nothing but the individual with respect to the capacity in question. They do not measure square feet or the years of training of somebody else with whom the individual has been associated. Conversely, any devices for measuring these things, or for counting hours or heads or books or the size of somebody's income are not educational standards. Educational standards may be set up by institutions, but they are not applicable to institutions. They are applicable only to persons.

How many of the standards used by standardizing agencies are educational standards? The answer is easy and brief. None. All the standards applied by these agencies are engineering standards or organization standards or political standards. And that is reasonable because they are set up as criteria for judging institutions, not for measuring education, which involves testing individuals. We may freely admit that the pressure put on institutions by these non-educational standards has increased the probability that media will be provided in which education can take place. We know that the general level of American education has been raised in consequence. But this phenomenon has been the indirect result of institutional standardizing. It cannot be definitely correlated with any existing standard or with any portion of a standard, except perhaps those portions specifying requirements for entrance and graduation—and even that is not certain.

As a profession are we willing to go on measuring the package in order to determine the chemical constitution of the contents? Obviously this Association is not willing. Otherwise it would not have undertaken the extensive inquiry into the whole question of college standards which has just been launched.

Although I am a member of the Committee that has the inquiry in charge—thus far, let me confess, a very negligent member—I do not now speak for the Committee. But you have asked me to say what principles should govern the formulation of standards by which institutions and the product of institutions are to be judged. I give you my answer in two words: Educational principles. I hope the Committee will finally recommend that all standards except educational standards be abandoned. To be sure, we do not at present possess a complete and satisfactory set of educational standards. They are being rapidly created, however. And those we have already are better measures of education than the statistical and political standards that now constitute the stock in trade of the standardizing agencies.

You may ask of what use will educational standards be in institutional accrediting? If I have been able to ex-

ress myself at all clearly you know hat I think of institutional accrediting. ut those who believe in that hazardous nd unjust pursuit could still continue follow it. They could use educational andards as they now use the other nd. They could make up exclusive sts of institutions on the basis of the lucational achievements of the students ho inhabit the institutions. Undoubtly those institutions that did not poss the paraphernalia necessary to hable their students to make creditable cords would by this means be stimuted to acquire them.

Nevertheless, I am optimistic enough to believe that if we can bring genuine educational standards into common use, the whole industry of institutional accrediting will go the way of the pollywog's tail. Like the pollywog's tail it is an instrument appropriate to an early stage of development. We shall then be willing to let each institution work out its own destiny in the manner best suited to its educational theories and its environment, without placing upon its brow either a laurel wreath or a crown of thorns.

Shifting the Emphasis from Quantity to Quality in High School Standards[1]

PAUL P. BOYD
Dean, College of Arts and Sciences
University of Kentucky

I owe the present opportunity to a paper which I read before the Association of Colleges and Secondary Schools of the Southern States in December. In that paper I presented a review of the wide-spread criticism, both from within and without, of the standardizing agencies because of their somewhat arbitrary and undiscriminating standards. I showed by statistics that even those standards supposedly easiest to apply and enforce were not enforced rigidly, and I raised the question whether other standards more qualitative, while admittedly not so easy to apply, would not receive about as satisfactory observance by member colleges and schools. I suggested that leniency in enforcement is a natural consequence of the undoubted almost universal lack of confidence in the validity of some standards. Professor Reeves' well-known conclusions were noticed, namely, that the "present standards of the North Central Association are not resulting in a satisfactory state of excellence in every accredited college," and that, in particular, "excellence is not dependent on the amount or proportion of income from any specific source."

The work of Dean Hudelson and others on class size was mentioned to disprove the expressed opinion of the Association that small classes are a mark of educational efficiency. Professor Yates' study of high school curricula was cited as tending to show that the influence of the type of high school curriculum on success in college is negligible. Considerable attention was given to the question of freshman grades as an index of high school efficiency in an attempt to discredit this method of rating. Finally an appeal was made for more independent thinking on the part of Association members and for larger emphasis upon research and the spreading of helpful advice in Association activities.

That paper suggested the first answer to the problem as to what our accrediting associations can do immediately to shift the emphasis from the old questionable or discredited standards without waiting for the report from the committee of the North Central Association which is attempting to discover a new type of measurement of efficiency and without waiting for the slow-moving wheels of official action to authorize specific changes. The commissions and their subcommittees are in essence both courts and interpreters of standards and the executive branch of the Association. What is going on in our political life is also in operation within the Associations. Rules and standards are being modified by interpretation and shift of emphasis. I have often seen certain strong features of a school or college given large weight to the neglect of other standards that were not met. And, indeed this is not so inaccurate and illegal as might appear, for the associations with which I am connected have already made elements of quality supreme so far as they can be discovered. The stand-

[1] A paper read before the National Association of Officers of Standardizing Agencies, in Detroit, February 24, 1931, and printed here at the request of N. C. A. Officers. — The Editor.

rds of the commission on secondary chools of the Southern Association, for nstance, provide that "the efficiency of nstruction, the acquired habits of hought and speech, the general intelectual and moral tone of a school are paramount factors" and that "in every case the character of the work done by a school must be the determining factor n accrediting." Certain standards are coming gradually to serve as bars to schools manifestly weak but not such for schools rating high in more important respects.

Already, then, our associations are shifting the emphasis toward quality by a better evaluation of the school as a whole and a more or less conscious neglect of violations of certain quantitative standards because of a conviction that the institution is soundly administered and effective in its teaching. This is not all due to the fact that a newer generation has come into power in the affairs of the associations. In the Southern Association a rather large number of men who were pioneers in the organization are still active and influential, some of whom, most of whom I believe, are out-and-out progressives. Indeed, some of the younger men seem to be the most profound literalists. They sometimes seem to "pay tithe of mint and anise and cummin and have omitted the weightier matters of the law, judgment, mercy and faith," and so are in danger of becoming "blind guides, which strain at a gnat and swallow a camel." This is a weakness of some honest people as well as of hypocrites.

Thus we progress in spite of quantitative standards. The American spirit is prone to override unimportant obstacles for the sake of desirable ends, to cut through red tape, in a fashion, to make our facts agree with our theory. Don't wait for a full legalistic formulation of our ideals, we say; do justice and let the law come later, as the formal statement of our belief and current practice. You cannot, after all, depersonalize the business of standardizing, as Dr. Wilbur has pointed out; which is well and good so long as you are successful in keeping your accrediting personnel wise and resourceful.

So the present situation is not so bad as it seems. The standards, some of them, may look bad in print but their administration results in just dealings almost always. Sometimes the decisions made are good not altogether because of the rules but in spite of them. We are none of us content, however, to rest in that position. We wish to move forward so that ultimately we can say confidently that an institution is good because it measures up to the standards that we set, not in spite of its failure to meet them fully.

What else can we do now to stress quality? We can make certain simple rearrangements in our statements of standards that will make it easier for our commissions to act in the interests of justice. I am thinking, for example, of the North Central's excellent arrangement of its material for accrediting under the four heads, policies, regulations, standards and recommendations. Policies are defined as rules governing procedures of the Commission on Secondary Schools; regulations are conditions that any school must meet in order that its application for accrediting may be considered; standards are rules for the government of high schools which may be violated only upon penalty of warning; and recommendations are guiding principles suggested in the interest of improvement of secondary education.

In the Southern Association's standards for secondary schools "shalls" and "shoulds" are flung together somewhat indiscriminately. In article 4 which contains the minimum standards for accrediting there are something like thirty-five "shalls" or the equivalent and six

"shoulds" or equivalent. This does not include the elaborate library requirements of article 11. Many of these "shalls," possibly most of them, are right, while some of them are open to question. But the point here is that they are placed together in such a way that often, I suspect, the committee forgets at the critical moment whether a regulation under discussion is a "shall" or a "should." It must help both the harrassed committeeman and the anxious applicant to have these items classified and arranged in the orderly way of the North Central Association. It becomes thereby easier to study the various regulations with a view to moving a misplaced point from one category to another, easier to transfer questionable "shalls" affecting items like pupil study load, length of laboratory period, laboratory work in general science, class size, length of class periods, and library into the list of recommendations, where they may remain until the voice of research speaks. Having gotten these matters in proper setting, the commission will have time to devote to the much more vital problems of properly trained teachers, teachers trained adequately in the subjects they teach, and possibly of curricula adapted to the needs of various communities.

I would like to propose another mechanical contrivance that I believe has considerable merit. In October, 1928, I suggested in an article in *School and Society* that the material contained in the standards for colleges, with considerable additional matter, be rearranged for purposes of inspection and rating under the following heads: I. What is the college attempting to do for its students? II. What for its teachers? III. What for its constituency? IV. What results of the efforts can be noted? V. What signs of progress? Losses and gains? VI. What problems of instruction or administration are being studied?

So far as I know, the proposal caused at the time scarcely a ripple on the educational deep, although it did get noticed in the Loyola *Educational Digest*. Perhaps the comment of one of my friends who is present today indicated the feeling of most of those who read the article. He said, "It looks pretty good, but can you make it work?" But it was my baby and I refuse to disown or forget it! I still maintain that all of the standards now in force could be advantageously rearranged for the report blank in some such form as I suggested, with the result of bringing to prominence qualitative features pertaining to an effective college that are now overlooked and unconsidered.

I believe that the same sort of outline can be advantageously used for the high school. There are other frames upon which much of the material may be strung for purposes of rating. First, all are familiar with the seven objectives of education proposed in the report of the Commission on the Reorganization of Secondary Education in 1918. They are health, command of fundamental processes, worthy home membership, vocation, citizenship, worthy use of leisure time, and ethical character. Let it be asked what the school is doing to promote every one of these objectives.

We might make use, also, of the four "ultimate objectives" for the organization and evaluation of curricular materials, the health objective, the leisure time objective, the social objective, the vocational objective. Under each of these are four subdivisions: A, acquiring of fruitful knowledge; B, developing interests, motives, ideals, attitudes and appreciation; C, development of mental techniques in memory, imagination, judgment and reasoning; and D, acquiring right habits of conduct and useful skills in living. While these are now applied to the curricular material only, they may be used to throw needed light

pon the quality of instruction, and to ring out much additional information oncerning the work of the school.

We might incorporate those objectives n an outline based upon the four neces- ary conditions for a good school, which aken together constitute a sufficient ondition. They are good buildings, ood equipment, good teachers, good ad- inistration. Certainly all the present tandards and the commonly accepted bjectives can be made to fit into such n outline. Would we not then find it asier to answer the question, "Is this chool a good school?" That is all, is not, that we wish to know. The ad- antage is that we would be able to focus ur attention upon a few cardinal ob- ectives, bringing all of our data to bear irectly upon these essential questions. We would be in less danger of rejecting school upon subordinate or even trivial ounts, as is said to have happened.

Would not the suggested rearrange- ent of information for rating prove a ontrivance conducive to clear thinking nd tending to shift the emphasis from he arithmetical features to those of uality?

But what has the present-day activity n tests and measurements to offer for ur salvation? Many of us have been nterested in the work of our psycholo- ists and have been thinking that in this irection lies the way out of our stand- rdizing difficulties. We have watched he work of the committee of the Na- ional Council on Education in the de- elopment of attainment tests and we xpect that the Committee on Revision f Standards of the North Central Asso- iation will have considerable to say bout the possibility of using them for standardizing purposes. We are follow- ng hopefully the Pennsylvania ten-year roject directed by Professor Wood and he surveys of secondary education and f teacher training under supervision of he Office of Education. Finally, we are counting on the unanimous backing of our regional association for the request voiced by the Middle States and Mary- land Association, that the Office of Edu- cation appoint a representative commit- tee to study the whole problem of col- lege entrance, including the selective processes. We can afford to wait for the final reports of these committees be- for surrendering the hope of being able to substitute a thorough-going objective test for the present mixture of stand- ards, some justifiable and some unscien- tific and arbitrary.

Not being a psychologist, I have been wondering what the psychologists thought of the possibility of using at- tainment tests in the business of accred- iting high schools. So I joined the ranks of the despised questionnaire fiends. In one of the Registrar's meetings a man arose and exclaimed, "Can't *something* be done to stop this damnable practice of sending out questionnaires?" We all sympathize with him, but when we have a paper to write and realize that prob- ably no physical harm can come to us, we send out the questionnaire! So I have been addressing the psychologists, and in a way acting as Nemesis, for psychologists have not been free from sin!

I asked them three questions. First, "Do you think that we have reached the stage where it would be advisable to use the attainment tests in the business of accrediting high schools?" Second, "How much weight in accrediting would you give to the attainment tests?" Third, "Would the time and expense involved in using the attainment tests for accred- iting be prohibitive?"

To the first question, thirty-eight an- swered yes and eleven no. As to weight, the replies ranged from "heavily" through two-thirds, one-half, one-third, to little and "none at all." Seven said that the expense would be prohibitive, and thirty said it would not be. Some,

it should be said, declined to express opinions on one or more of the questions.

It appears then that a majority of my psychologists are of the opinion that the attainment tests may be advantageously used in rating high schools. But practically all of them would insist on using other tests and other information. It is pointed out that attainment data must be considered in connection with intelligence levels. Tests given to high school seniors have revealed wide differences in the abilities of students in accredited schools of the same rating. In one state, in a high school graduating twenty seniors, the best student answered correctly only sixty questions out of one hundred and fifty. In another school, of the same accreditment, the poorest senior answered correctly seventy of the same questions. In this same test, in one high school, the best senior answered correctly only eight out of twenty-five questions in mathematics, while in another school of the same size and rating the worst senior gave correct answers to sixteen. In another state, where the American Council Psychological Examination has been used, the median score for some schools has been found near the 75 percentile, while in other large schools the median score is around the 25 percentile. If the present accrediting of these schools is right, certainly the mere attainment tests without their intelligence levels would be misleading.

This need for the combination of intelligence and attainment tests is emphasized by another correspondent connected with one of our large city systems. In this city, high school (A) would always be accredited if the rating were based on attainment alone, while school (B) would never be accredited. But the writer adds, "I would say that the preparation and attainment as measured by the ability of those attaining was always better in (B) than in (A)."

One advantage claimed for the testing device is that the quality of graduates over a period of years may be compared. A writer states that at one university the tests show a striking decline in intelligence among freshmen, which he thinks is due to increased laxity in requirements put upon the students. One city is mentioned by way of illustration where the boast is made that there are no repeaters in the schools. Teachers must pass everybody.

Various difficulties and dangers are pointed out that stand in the way of applying a testing program in the accrediting of high schools. There is the danger of "teaching up to the tests," of shaping the teachers' program to prepare specifically for the tests, of "cramming" and thus of defeating the purposes in view. There is danger in any wide-spread program of testing that untrained men will do a work that calls for specialists; that high schools may not be fair in the scoring; that pupils may be retarded or eliminated from school if they do not have the interests and talents demanded for college entrance; that by giving too much weight to the tests the objectives of education may be restricted; that overemphasis may be placed upon subject matter and memorization of facts. The opinion is expressed that the tests, while good in skill subjects like compositions, are not so good in literature and the social sciences. Objection to use of the tests for standardizing purposes is made on the ground of the great variation in the content of courses in different high schools. In other words the tests as now put forth are not reliable enough to test the total achievement of the student.

These facts and opinions lead us to conclude that after all the test, insofar as it is useful, is of real use in rating the individual rather than the school. If you have reliable data from attainment

nd intelligence tests, several ask, why ccredit schools at all for admission to ollege by high school certificates? The gical thing is for the colleges to acredit the individual graduates rather han the school as a whole. That this an be done with a high degree of acuracy has been shown by a considerable umber of studies. Dean Johnston, at ne University of Minnesota, for instance, has found that "in no year up to 928-29 did more than two per cent of ne students listed as unfit for college o satisfactory work in college."

However, there is reason to believe, udging from the opinions expressed by ne psychologists, that a wider use of ne tests may react beneficially in the ctivities of the accrediting agencies. A chool low in intelligence may be found o rank high in attainment, and thus light ay be thrown upon the character of nstruction which certainly is of prime mportance entirely apart from considertions of college entrance. On the other and, a school with high average intelligence and a low attainment score would e subject to question in the matter of eaching efficiency and adjustment of the chool program to the needs of the students. Thus especially in cases of doubt s to the worthiness of a particular school he tests would help. But perhaps as aluable a result from the standpoint of he accrediting agency of the use of the ests would be the reaction upon the minds and attitudes of the state and regional committeemen, the "psychological effect." It seems hardly possible that here would not be a tendency toward change in point of view, a shift in emphasis from quantitative standards to those indicating quality. For this reason, it is desirable and important that our accrediting agencies begin to foster testing programs on a modest scale, experimenting in type schools and gathering such information in doubtful cases. Not only might the Association save itself in its attempt to save others. It might actually contribute to the scientific study and development of valid tests. It would certainly be moving in the right direction for future usefulness.

One other development would help in the desired shift of emphasis, an extension of the policy of employing full time inspectors or supervisors who would make a practice of visiting schools applying for admission and those that are deemed of doubtful quality. A personal visit with the chance to see the machine in operation is, as we all know, of immense value in bringing into view points of school spirit, and enthusiasm and interest and effective teaching and administrative efficiency, matters hard to judge from the printed report. The state committees, to be sure, are doing this work to a certain extent. However, we need also the opinion of the outsider, for there is great value in inspection by persons who do not have local connections and who are making a specialty of the work, and who carry throughout a constant point of view. Such a man would speak with authority and would be so freed from suspicion of local prejudices and influences that when he said a school is doing good work and should be accredited in spite of deficiencies, his opinion would prevail. Perhaps he would lose his job after a while, but anyway he would have the comfort of perishing in a worthy cause!

So I would advocate the extension of the policy of employment of association inspectors and advisers on a full time basis.

What is the purpose of standardizing high schools? Without doubt it found its origin in the desire of the colleges and universities to insure well-prepared freshmen without the labor and expense of entrance examinations and to avoid their well-known weaknesses. The inclusion of both college and secondary school men in the same regional associa-

tion implies that the dominant thought at the time of organization was preparation for college. At present, however, the accrediting of secondary schools is largely controlled by secondary school men, although the original idea of preparation for college is still strong, even in the minds of the secondary school men. But the trend, for the public high schools, is certainly toward the "people's college" idea and the aim in standardizing is becoming more and more the improvement of the high school for the benefit and service of the large number of students who never go to college.

The high school is ceasing to be primarily a college preparatory school. That is only one of the aims. We may as well recognize the fact that a good high school may very properly graduate some students unfitted for college. Why not? We may expect that, even more than we expect the college, even the best, to graduate some students who fall short of some of the aims of the liberal college.

It follows inevitably that colleges must stop trying to control the high schools for their own ends and must eventually discard the practice of admitting all graduates of an accredited high school upon certificate and turn to the newer, better plan of admitting worthy individuals. It follows just as surely that with the problem clarified by a fuller recognition of the broad function of the high school and of the real purpose of standardizing, the emphasis on some standards will change, new standards will emerge, and others will become as extinct as the seventeenth century dodo. Colleges and high schools will both be the gainers.

The Experience of Colorado State Teachers College With New Entrance Requirements[1]

GEORGE WILLARD FRASIER
President, Colorado State Teachers College

On the fifteenth day of December, 928, Colorado State Teachers College nnounced new entrance requirements. h this announcement it was stated that ereafter the college would select its reshmen on the basis of four criteria: 1) Health, as determined through an kamination by the college physicians; 2) Character, as determined by recomendations from school officials; (3) raduation from a high school; and 4) Ability to do college work as evinced by scores made on a battery of sts. The new plan went into effect lith the beginning of the college year 929-30. We have, up to the present me, selected two groups of freshmen v this method.

The first question concerning this ethod of entrance, which you will natrally ask, is, Why was this change ade? It was made because we had rtain definite information that argued rongly in favor of some such change:

1. We had a picture before us of the ommon practice in our high schools. Ve learned that it is customary for rincipals to call their high school stuents together to advise them concerning heir high school course in some such shion as the followinig: "How many f you plan to go to college?" If this uestion is asked during the freshman nd sophomore years of high school, ractically 100 per cent vote *yes*. Of burse they all hope to go to college. o the principal goes on to say, "Inasuch as you intend to go to college, tou must now take those courses in high school that will admit you to the college of your choice. As soon as possible you should choose the college which you hope to attend and map out a program that will fit the entrance requirements of that college." So the student, acting upon the advice of the principal, sends to the college of his choice for a catalog. He turns to the section devoted to entrance and there learns what subjects he is required to take during his high school course. We believe that this practice is thoroughly bad. High school students in general have no choice concerning courses in the high school because the matter is dictated and controlled by the college.

2. We had also talked with parents of high school boys and girls. We learned that parents insist upon children taking the courses that will admit them to the college of their choice. We had often seen high school students struggling with subject matter for which they had no use and which was a source of distress to them, and omitting those things from their courses that would have brought joy and happiness into their lives, because, acting under the advice of their principal and the demands of their parents, they were following the pattern of subjects laid down by a college that they probably would never attend. We have asked parents why they did this, and the reply has always been, "We are helpless. We wish our boys and girls to go to college; therefore, they must take the subjects that the colleges demand for entrance."

3. We had also learned that public school officials were helpless to change the system. I once criticized the course

[1] An address delivered before the Associaon at its meeting in Chicago, March, 1931.—he Editor.

of study in a high school that should have been modern and progressive, only to have the principal reply to me, "Everything you say is true. I know what a high school curriculum should be, but my hands are tied completely by the requirements of the state university and by the colleges where my pupils hope to go. I must provide the necessary mathematics and foreign language, even though in doing so I must sacrifice other things I consider to be of greater value. I must teach history in periods and courses, in spite of the fact that I know the new trend in social studies is much more valuable. I should like to defy tradition and the colleges and conduct a high school the way it should be conducted; but my hands are tied not only by the colleges but by the school board and the parents. The parents demand that I prepare graduates for Yale and Harvard and Chicago, the state university, and the other colleges in our region. The school board demands that I please the parents. So instead of using the knowledge I have concerning secondary education in the building of my curriculum, I must set up and present those subjects that are required for admission in the schools where my students go later. It is true that only half of our graduates ever go to college, but early in their careers they all plan on it; so I must sacrifice at least half of my graduates for the sake of keeping my institution respectable in the eyes of the colleges, parents, and the school board."

I agree with this principal in that he is helpless, and I presume that if I were in his position I should do exactly as he is doing. If he could be free from the specific college entrance requirements, the problem would immediately solve itself.

4. We had read the literature of education so far as it is concerned with this subject of college entrance; and we had found that practically everything written in this field was a protest against college domination of high schools and a demand for a readjustment of the relationships. Professor Jesse B. Davis of Boston University, after making a study of opinions of high school principals, concluded:

> "For these reasons the principals feel that the present college entrance requirements are a hindrance to modern progressive movements in secondary education."[2]

A committee of the Department of Superintendence of the National Education Association in its 1928 report says:

> "Small high schools cannot meet community needs and at the same time satisfy entrance requirements of some colleges."
>
> And
>
> "The college must recognize that the high school has other functions than college preparation."[3]

Let us refer again to this committee of the Department of Superintendence. It makes the following statement, written by one of its members, as the most stimulating and constructive contribution to the whole discussion:

> "We are not going to get anywhere in this college admission discussion until we succeed in switching the emphasis from that of insisting on a certain pattern of subjects taken in a high school, to that of selecting the best type of individual upon whom to expend the time and money involved in a college or university course."[4]

Over twenty years ago David Starr

---

[2] Davis, J. B. "The Influence of College Entrance Requirements on the Public High Schools of New England." *School Review*, Vol. 31, p. 450, June, 1923.

[3] Sixth Yearbook, Department of Superintendence, National Education Association, p. 137, Washington, D. C., 1928.

[4] Sixth Yearbook, Op. cit., p. 137.

lan wrote what I consider to be an ired thought in this connection:

The high school curriculum is primarily a subject for determination by secondary school men; and . . . aside rom insisting on high standards, the niversity should avoid all interest nd appearance of dictation."[5]

rofessor William Martin Proctor of nford University recently said:

There should be a new declaration of ndependence issued by the American igh school. It should set forth the etermination of the secondary school o serve first its own community. It hould insist that the college adopt a nethod of selecting its students which ill permit the reorganization of the igh school program of studies along nes that are scientifically sound and ocially desirable. . . . When college omination is ended, there will be a ew era of intelligent coöperation beween secondary schools and colleges, o the great advantage of both."[6]

ounts, of Teachers College, writes in *gressive Education:*

The college is another factor which as always tended to exert a conservative influence on the secondary school urriculum. During the early history f secondary education in America, ince its sole function was to prepare upils for college, this domination by igher education created no hardship. n recent years, however, because of s changed functions, the high school as often desired to move more rapidly han the college or in directions not pproved by the higher institution. It as consequently found this domination increasingly irksome."[7]

[5] David Starr Jordan, Fourth Annual Report he President, p. 88.

[6] Proctor, W. M. "Curriculum Revision and ege Entrance Requirements," *School Review*, Vol. 35, p. 411, June, 1927.

[7] Counts, G. S. *Progressive Education,* Fall 8, p. 339.

Cooke, of the Frances Parker School of Chicago, says:

> "Since constructive suggestions were asked for, we suggest that the greatest immediate improvement would come from a radical change in the requirements and plan for entrance to the major colleges."[8]

I shall not take your time to give more quotations from writers in the field of education. I believe most of you are familiar with the fact that for the past twenty years there has been a constant demand for a readjustment of the relationship between the high school and college. In the second place we have read the literature that has to do with the new field of educational tests and measurements. We discovered from the experience of Stanford, Columbia, and other progressive institutions that the intelligence test and other general tests were extremely valuable in selecting students for admission to college. We learned from Dr. Ben D. Wood of Columbia, for example, that "the intelligence test was the best single criterion for judging the ability to do college work that has yet been discovered." We had also read the literature of the test and measurement field so far as it involved ability grouping in elementary and secondary schools. We had become convinced that perhaps it would be wise for us to forget specific subjects taken in high school and select the students who could do college work.

5. For four years previous to 1928, Colorado State Teachers College had been carrying on a series of experiments with entering freshmen. Every student presenting himself for admission had been given a standard group intelligence test, an English test, an achievement test, and other miscellaneous tests. These test scores were very valuable to us in making our decision to set up new re-

[8] Cooke, Flora J. *Progressive Education,* Fall, 1928, p. 319.

quirements. We discovered that these scores, more than any other single factor, have contributed to our knowledge of the students' ability to do college work.

Let me briefly present a few significant findings:

In 1926 the entering class numbered 626. Of this group 30 per cent failed to complete the first year's work. Of the 187 who failed to complete three quarters of work, 40 per cent were in the lowest 20 per cent in intelligence; 65 per cent were in the lower 50 per cent; and but 24 or 13 per cent were in the upper twenty per cent. Distributions of scholastic ratings by deciles according to intelligence show the intelligence scores to have a fairly high predictive value, particularly among the lower scores. Chances are only about even of a student finishing three quarters of work, if he is found in the lowest fifth of the intelligence distribution. Chances are 4.6 to 1 that a student in the highest fifth of the intelligence distribution will complete three quarters of work.

Of the 559 students who entered college in the fall of 1927, twenty-eight (five per cent) were dropped from college at the close of the fall quarter. Sixteen (57 per cent) of these were in the lowest 20 per cent in intelligence as measured with the Thurstone test; and over 64 per cent were in the lower half in intelligence; thirty-two (about one-third) did the poorest work in their college studies, being found in the lowest fifth in scholarship also.

During the second quarter of 1927-28, 76 more of the 559 entering freshmen dropped out of college. More than a third (34 per cent) of them were in the lowest 20 per cent in intelligence; and over two-thirds (68 per cent) were in the lower 50 per cent. Less than 8 per cent were among the most intelligent group.

At the close of the third quarter, only 430 of the 559 students who began work in the fall, completed their work of year. One hundred and twenty-n failed.

The average scholarship rating of least intelligent students for three qu ters was 2.57; and for the most in ligent 3.58; 3.0 being the median sc for the college. Intelligence scores c related positively with college schol ship +.45 to +.50.

The other freshman classes have b studied in the same manner with exac the same results. During the later ye the achievement test has predicted po ible college success with more accura than the Thurstone test; and the t tests taken together are more valua than either of them considered sep ately.

6. Careful investigation of the patte of subjects offered for entrance fail to reveal to us any relationship betwe ability to do college work and speci subjects taken in the high school. study was made in 1923 of the freshm class of this college for the school ye 1922-23. There were 217 student re ords available. The purpose of the stu was to evaluate the various high scho subjects presented for college entran by noting the college success of pup offering various amounts of these su jects. The most important conclusi was,

> "There is no significant evidence in th investigation to show that one subje or group of subjects is of greater val in itself than any other, as an aid successful college work. . . . The ev dence tends to show that two peop of equal ability, studying differe subjects in high school, may do co lege work of equal grade."[9]

7. We had known for some time th Stanford University had pursued

[9] Gebhardt, G. L. *Relative Values of C lege Entrance Subjects.* Unpublished Mas of Arts Thesis, Colorado State Teachers C lege, Greeley, 1923.

ral policy in dealing with high schools. might be well to quote a paragraph m the Stanford catalog:

"The standard of preparation is the our years' high-school course. The roper coördination of high-school ubjects for the individual pupil is re- arded as primarily a problem for the econdary school; the University is repared to recognize for entrance redit any subject having an estab- ished place in the secondary school urriculum, in which adequate instruc- ion is given and which is pursued to atisfactory results."

We had also known quite intimately quality of students at Stanford and re willing to take chances on the same e.

For the seven reasons just explained, change in entrance requirement was le. So far as this college is concerned have relieved the high school of the essity of setting up a certain pattern subjects for us. It is important, how- r, to note in this connection that on day our first group of freshmen en- ed under these entrance requirements, also put into effect a complete new riculum in the junior college depart- nt of our college. We believe that ot of the education of teachers should a general cultural background. In er words we hold that a teacher should w those things that are common owledge among educated and cultured ple. For this reason we have set up eries of courses of a general nature. ese courses deal with science, history, rature, art, music, sociology, hygiene, l education. These are not the usual shman courses each dealing with a cialized piece of subject matter; but y are big, comprehensive courses made include much subject matter of a neral nature. The science course, for mple, was written jointly by the mbers of the science staff of the col- lege. It was necessary to do much orig- inal work because there were no text- books suitable for such a course. In this course there is no attempt to separate physics, chemistry, botany, zoology, ge- ology, and astronomy. The course is organized in large units and each unit gives the scientific information from all related fields. The materials of the course are voluminous; in fact we have mimeographed and printed hundreds of thousands of pages of material. This is the second year for this experimental curriculum and it has been a tremendous success. It is popular with the students and succeeds in giving them a basic background that teachers do not gener- ally have. It is true that teachers col- leges and other colleges have in the past often required a certain number of credits in science; but this requirement could be satisfied by courses in physics or chemistry or any other specific science. However, the eight-hour science require- ment for the freshmen of our college cen be met only by the course explained above. In general we have carried out the same scheme with our other fresh- man courses. There were no textbooks available. For this reason it was nec- essary for us to compile material for practically every course in this new cur- riculum. We are following these courses with well-worked-out comprehensive ex- aminations to make sure that the students have really got the information that we wish them to have. In other words we are doing on the junior college level the cultural job that we had hoped for years the high schools would do—and that some of them are doing very well. I should add also that we are now setting up placement examinations. Students passing these examinations will not be held for the courses.

I give this explanation of our new curriculum here because I never discuss our entrance requirements without also giving an explanation of the new curric-

ulum. The relationship should be apparent. The only reason for colleges holding to a fixed pattern of subjects in high school is to guarantee to them a freshman body with a common background. We get the common background and get it much better through our new curriculum.

The next question a serious-minded person would ask is, "What has been the result of this change up to date?" Let me say first of all that the college has received almost unanimous commendation for its change in policy. I have personally received hundreds of letters of congratulation and commendation on this change. However, I shall not take your time to present any of them. So far as I know there has been only one published criticism on these entrance requirements. That criticism was found on the editorial pages of the *School Review*. This magazine, as you know, is published by the School of Education of the University of Chicago. The editor discussed our new entrance requirements and concluded with, "If the Thurstone test is to be used, will it not be likely to condition the high school curriculum in spite of the statement that 'the high school curriculum is a high school problem'? In short, does not the Colorado State Teachers College take back with its left hand what it presents with its right?" Of course my answer to this question is *no*. A child entering high school who wishes later to enter Colorado State Teachers College will take the advice of his principal, his parents, and his teachers on what he should take in high school, knowing that anything that satisfies the high school for graduation will satisfy our college for admission. A casual glance at the Thurstone test would convince one that it would be impossible to plan a high school curriculum or even a single high school course to prepare a student to pass this examination.

In the second place, the present entrance requirements have brought us a student body at least as good as we wou have got under the old plan. The fi freshman class admitted under this pl consisted of 452 students. Of this gro 269 or 60 per cent of them would ha been admitted to the University of Col rado or any one of the other universiti demanding the usual academic pattern subjects taken in a high school. Of the freshmen 183 or 40 per cent would ha been refused admission to these oth institutions. The difference in the m dian of the Thurstone scores of the tw groups was .72 of one point, which much smaller than a probable error of th test. Seven entering freshmen receive the highest possible score on the Thur tont test. *Four of these could not ha entered any college demanding the ac demic pattern for admission.* Of th freshmen who could not have entered traditional college, 85 were above th median score made by the tradition group. We are following the academ record of the two groups for four yea of college work; and at a later date wi have more information concerning th question. Up to the present time th differences have been so small that it not possible to draw any valid conclu sions.

In addition to the fact that we hav got as good students with new entranc requirements as we would have unde the old scheme, we have the satisfactio of knowing that we have at least mad a beginning in the freeing of high school from the necessity of allowing college to write their curriculums.

The next logical question would be What are your plans for the future We plan to continue with our presen type of entrance requirements until w find something better. We have becom convinced that the most important in formation we can get concerning an in coming freshman is his scores on battery of tests, his record of success i high school, and all of the personal dat

e can possibly obtain concerning his udy habits and anything else that may ffect his ability to do college work.

Dr. W. W. Charters, discussing this ubject editorially in the last number of he Journal of Higher Education, wrote:

"No one index is a competent guide, but all combined reduce the probability of error in judgment."

I agree with this statement.

Ben Wood said in Greeley a few days go:

"If an individual is ever a genuine college student he is such from birth, and not by the accident of attaining a given chronological age or of graduating from high school. The differential needs of college students are greater and more crucial at the age of 6 to 8 years than at 16 or 18 years."

We are at the present time setting up Department of Personnel Studies and re turning our attention to the building p of data concerning the life and hab- s of our incoming freshmen. When hese students are admitted, the records vill be made available to all teachers nd advisers, so we can help students hake the best of their ability.

This is a great day in which to be a ollege administrator or to be interested n this thing we call higher education. On every hand there is evidence of ex- erimentation and new ventures. I fol- ow all of these with great interest. I hould like to predict great changes in ollege education for the future.

Intelligent men and women are ask- ng, "Is college education worth while?" Some are answering it in the negative. f colleges are to hold their own, much work must be done on curriculum and n the articulating of the colleges with he high schools and with life.

One of the most interesting experi- ments in higher education now being started is the one at the University of Chicago. There is a great challenge in this new plan for university study. Its possibilities are so great that it is difficult to comprehend all its educational implications. The establishment of the college with its cultural courses with no set length of time and with its comprehensive examinations is a great step forward. The success of the plan will hinge at least in part on the kind of examinations set up. May I also add that the University of Chicago, to be logical, should allow the high schools the same freedom. The spirit that has freed the college from time serving and specific credits should free the high schools also. However, up to date such a change has not been announced. We have found, as many of you have, that a student graduating from a high school approved by this association and presenting three years of English will often fail to pass a standard eighth-grade examination on the fundamentals of English, and fall down completely on a comprehensive literature test. Is not the ability to pass an English examination of more value to a college than the mere time serving of three years in high school English?

The Pennsylvania Survey of High Schools shows, in American History, that the students who had taken it only one semester scored highest; those who had taken a year were next; and those who had more than a year were lower yet. This shows that a bright pupil will learn more in a semester than an average pupil will learn in a year or a dull pupil in two years.

You will also remember that the Pennsylvania Survey of College Sophomores showed that 20 per cent of them could not answer a single question of 150 given in mathematics.

From the standpoint of ordinary common sense, it seems to me that comprehensive achievement examinations which would establish how much a student knows about subjects are of more value to a college administration than a state-

ment of time serving and subjective grades.

A Summary of Conclusions:

1. Our new entrance requirements are at least as good as the old prescribed unit requirements.

2. We have the satisfaction of knowing that while we have lost nothing, the high schools have gained much.

3. Group intelligence tests are very valuable but cannot be relied upon as a single criterion for admission.

4. A battery of tests, including intelligence and achievement tests, is a much more valuable means of selecting candidates for admission.

5. The results obtained from a batter of tests when combined with a carefi health examination, knowledge of hig school success, and evidence of charact is a safe criterion for admission to co lege; but to this should be added muc individual information concerning eac student and his habits.

6. The least valuable informatio concerning a candidate is the pattern c subjects taken in high school.

7. Colorado State Teachers Colleg intends to continue its experimentatio along this line. When we find a bette method of selecting students we sha adopt it.

The Results of A Testing Program[1]

BEN D. WOOD

Professor of Collegiate Educational Research
Columbia University

The data which I have been requested show you here this afternoon are the sults derived from tests which were ven in May, 1928, to the college seniors forty-nine Pennsylvania colleges, and so the results of a similar examination ven last May, 1930, to the sophomores about forty institutions, and to the reshmen, juniors and seniors in six ennsylvania colleges. I shall also show ou some test results on high school sen- rs of that great commonwealth.

The first test, given in May, 1928, in- luded about 3500 questions distributed ver the whole field of liberal arts and beral education. It did not provide for rofessional education of any sort. We ave this test not with any idea that we ere measuring the whole of education. measures only a part, primarily perhaps he informational or content aspect of the iberal education. It seems to us a very mportant type of measurement to make. t is the only type thus far evolved which ermits us to secure comparable data on tudents from different institutions. In ny case, the results of such an examina- ion have been shown, by twenty years of esearch, to be highly correlated with the nore imponderable aspects of educational chievement.

If the operator will turn out the lights nd show the first slide, I will give you as rief an explanation as I can.

As I say, this examination included bout 3500 questions on the whole field of iberal arts. This chart shows the scores t the left from 200 up to about 1050. The ndividual colleges are concealed by num- bers down at the bottom. Each of these heavy vertical lines refers to an individual college, one of the forty-nine in Pennsylvania that participated in this study. The general state-wide average of 4412 college seniors from forty-nine Pennsylvania colleges is represented by this heavy horizontal line. It is at about 570 points.

One-fourth of the college seniors of that year secured scores below this horizontal line, that is, below 430. One-fourth of the students secured scores above this line, 670 points. From the viewpoint of the Accrediting Commission, and especially in view of President Capen's reference to the tail of the polly-wog yesterday, it seems to me this chart should be of interest to the Committee on Revision of Accrediting Standards. In my own thinking I do not confuse institutional accrediting with individual accrediting. The two things need not be in opposition. Personally, I believe the very valuable accrediting work that has been thus far done by this Association should be continued, and perhaps strengthened a great deal. So when I advocate individual accrediting on the basis of a study of the products of education in the only place where education really exists, namely, in the hearts and minds of individuals, I am not opposing or discountenancing in any way the valuable work of accrediting that has thus far been done, nor am I encouraging any idea that it should be discontinued in any aspect. This is an additional approach to the problem of giving young men and women of this country the best we can in the way of educational opportunities.

[1] This is a stenographic report of Dr. Wood's address given before the Association on March 9, 1931, and using slides.—The Editor.

Notice the very large differences between institutions. Here is one with an average of about 870, and a second one about 850. Here are some down here with averages around 360 to 400. The highest students in some of these institutions hardly reach the lowest quartile of these up here. About the only thing these institutions have in common with these, so far as these tests indicate, is the name "college." (Laughter).

Some of the institutions down in this region are accredited, so far as I can tell, just as well as some of these up here. We find some institutions that are thus accredited that are giving us very poor students, and we find some institutions that are not accredited that are giving us some very excellent students. Let it be rememberd that all the Nobel prize winners of this country have come from relatively small institutions, not from the more famous and largest ones in the country. It seems to me that our obligation to society demands that we take up now this problem of individual accrediting over and above institutional accrediting.

There is one other difference here. Notice these first two institutions which have similar averages. One of them has scores which range down to this point and off the chart at the top about six feet, having a total range of scores among the seniors of that first college of about 1200 points. Thus we have tremendous individual differences within the same accredited college.

Next to that first college you have a second college whose total range is from this point only to the edge of the chart, a total range of only about 600 points. Here you have similar differences in these two colleges, with practically 90 per cent of the students between the state-wide quartiles, upper and lower. On each side you have institutions whose students run clear off the chart in both directions. All of these individuals got baccalaureate degrees of the same fa value, a great majority of these insti tions giving those degrees under the a creditation of this Association or a sim lar association. I guess it is another a sociation. (Laughter).

That is the fundamental weakness the degree and of all diplomas I ha seen. It seems to me that the etymolo of the word "diploma" is suggested this relation. It comes, I am told Greek scholars, from two Greek roo "di" meaning two, and "ploma" h something to do with face. Anyway, is two-faced. That is how we get t word "diplomat." (Laughter) The d gree seems to be merely a diplomat scrap of paper like that which was to up at the beginning of the Great War relation to Belgian neutrality. If it ha any real information on it, if it even ga the height and weight and age of the i dividual in a certain year it might be useful document. If we should give som real information regarding the capaciti and achievements and experiences these individuals, perhaps there would a great lessening of pressure on the co lege gates rather quickly. Most of the people who want the degree, without ha ing any of the attributes of a baccalau eate mind, would perhaps not want t degree if they knew in advance that t college would give as exact and honest description of their minds and exper iences as we could find out about the instead of giving them simply an em blem, a diploma, a badge of prestige.

Let me call your attention finally t this line over here. About 500 member of faculties, I believe, started the examin ation with the students and about 200 fin ished. They had other duties, of course The average score of these 200 facult members is somewhat better than that o the first college, so the charge that colleg professors are not educated is unfounded (Laughter) One-fourth of these colleg professors, according to this test, are be

ow this point, and 7 per cent are below the state-wide lower quartile. Then we have one heroic soul below the line of the chart. (Laughter).

Here I show you the results for these 4400-odd college seniors for May, 1928, according to chronological age, eighteen years old, nineteen, twenty, and up to twenty-eight and above.

Up here you have the state-wide average indicated by that line, and the upper quartile indicated by this line, and the lower quartile for the state-wide group indicated by this line. Notice the range of scores of the middle half of the eighteen-year-olds, from this point up to 1000, with the average at this point. The eighteen-year-olds have an average at this high point, then down to nineteen, twenty, twenty-one, twenty-two, twenty-three and twenty-four. Sometimes I say that this chart indicates the older they are and the more college education they have had the less they know. (Laughter).

Here, after the age of twenty-four, the averages somewhat recover and almost reach the state-wide average again at twenty-eight or above. This type of chart we get from almost every grade, from the second grade up; that is, the younger children who have had the least formal schooling tend to be more intelligent and better educated than the older students in the same grade. It is just another commentary on the fact that we have a good school system, and no system of education, as Dr. Cooper said at the Atlanta meeting last December.

Here I show you the distribution of these 4400 college seniors according to curriculum major or degree group. There are nearly 600 engineers, nearly 1800 A. B. students, about 845 B. S. students, 486 education majors, and 732 commerce and finance majors.

Here I show you the state-wide distribution of the middle half of the scores, and here is the average of the engineers and of the A. B. students. In general, these curriculum groups of which we make so much, and, when we are discussing the curriculum, seem to be about the same as regards general culture.

When we were about to give this test, some of the officers of some of the engineering departments in the schools suggested that it would be very unfair to compare their engineering students with the A. B. students on a test which was designed primarily for liberal arts students, because these engineers have given all or most of their last two years in college to engineering subject matter. We promised not to emphasize the comparison between engineers and A. B. students, but here we break that promise, I take it, with the consent of the engineering faculties since the engineering students are almost equal to the A. B. students so far as this test can measure general culture. The other groups are at average or just a little below.

Here we get some slight difference between the different curriculum groups with respect to natural science, which is one of the three major divisions of the examination, but the differences seem to be much greater here than they actually are. The most prominent feature of this chart is that according to this test none of these curriculum groups knew very much science. There were about 800 items in the test. The engineers average only 115, and the liberal arts group, the A. B. students, average only about 66, and that in an age when science is supposed to be a very important part of a liberal education. This civilization has been reconstructed by science, and it would seem that a liberally educated person ought to know more than 65 or 66 items of information on science out of a possible 700 or 800.

Here I show you the chart on the mathematics test results. I do so with some hesitation. The examination included about 120 items concerned entirely with operations, not with problems. We

had no room in the examination for a test of mathematical problems, of problem-solving ability, so we put in a few questions to see if they knew the words without the tune. (Laughter).

Out of 120 possible items, the total state-wide group of 4400 baccalaureates got an average of only 16 points. One-fourth of them get scores of two or less. One in five gets zero score. The engineers, who should have answered every question in a few minutes, get an average of 52.5. The A. B. students, the bearers of the intellectual heritage of the race, get an average of 11 points, and the B. S. students an average of 16. The education majors, those who are going to enforce the mathematics requirement, get an average of 8. (Laughter).

It seems to me if those who enforce these rules knew more mathematics they wouldn't make it a requirement. They would know you couldn't enforce that really. You can make a mule come to a trough, but you can't make him drink. You might as well legislate that all students must be six feet tall.

There were a few very simple arithmetic questions asked, and the commerce group gets an average of 6.

Here I bring you to what we consider the real heart of the Pennsylvania study. The Pennsylvania study differs from other educational surveys in one or two important respects. Important as the other surveys are, we thought in this study with the collaboration of the Pennsylvania colleges and high schools, we would study the educational product itself as directly as we could. Moreover, we conceived that education if it existed at all, was growth and therefore could not be measured by one instantaneous exposure. Therefore, the study was planned originally to go over a period of ten years, and study a selected number of students on a cumulative and continuous basis by means of tests and other types of information which would give us comparable results, measurements on the same individual over a long period of years.

In this process we are now following about 5,000 students through college. The experimental group is now in the third year, and in high school we are following about 15,000 students who finished the sixth grade in May, 1928. That group we plan to follow right through six years of high school and through four years of college, if they survive that long.

This chart is the record of an individual during four years of high school and three and one-half years of college tuition. This record is plotted on the background of the cumulative record folder suggested and published by the American Council on Education and explained in the Educational Record supplement of May, 1928. It is the form which has been adopted with modifications for use in the Tulsa experiment, and in a large number of other institutions.

Notice, in general, that the plan of this record is to give you a moving picture of the individual. It is therefore arranged in calendar year columns from left to right. This column here represents the year 1921, then 1922, and it goes over to the year 1928. The marks on this chart refer to school grades. This heavy horizontal line represents the average, and the position above indicates high grades, and below that line low grades. The scale is given here at the left in terms of letter grades, percentages, and percentiles. The lines are drawn at half sigma intervals, if that means anything.

This individual entered the ninth grade at the age of ten and one-half years, in 1921, and graduated from high school four years later in January, 1925, entered college immediately and graduated three and one-half years later. Notice that she gets a high grade here in French, B grade in mathematics and Spanish, and a mediocre grade in Eng-

sh. Some of the grades go far up and own. In French it drops down to this oint (C), goes back up there to B, hen way down to a failing grade, and hen up again to a good B grade.

Of course, that couldn't possibly be rue of any individual's achievement in rench. Not even in an insane asylum ould you find a human mind catching n and dropping French language in hat sudden and reversible way. Inves- gation showed that it was not even an ttempt to represent the individual's chievement in French. It was simply n attempt to indicate the degree to hich this individual had conformed to he external rituals of the institution. he teachers of French of this young oman said she was as good each semes- er as she was the first, if not better, but her grades were lowered because she ersisted in the highly undisciplined ustom of cutting class. She got so in- erested in her work in the library and tudied so hard she could not hear these raucous bells ringing every fifty min- utes. Because she was capable and had elf-initiative enough to do independent study she was punished by having her grades reduced, and in some cases all credits removed.

Sometimes, in many colleges, we have these attendance rules which practically force the institution to misrepresent achievement of that sort. This individ- ual, who from the viewpoint of the registrar's record looks like a very irreg- ular case with some low grades, and going up and down, when confronted with this long examination gets a score in the highest one per cent when she was only seventeen and one-half years old, and after only three and one-half years in college. Her lowest marks were in chemistry and biology. She had not had chemistry since her junior year in high school, and never studied biology in school. Where did she learn that? It is undisciplinary, of course, to learn something outside of the purview of the policemen called teachers. She had no business knowing any biology.

In general this shows you have an individual of a genuine collegiate type, and this individual has been a college student ever since she was born. College students who are really such do not become college students by virtue of the accident of having graduated from high school or having attained a certain chronological age. If they are genuine college students, they are such from birth. I believe that their differential needs at the age of six or eight years are much greater than their differential needs of sixteen or eighteen. I do not believe colleges can discharge their duty to the college-minded youth of this country without the interest and continuous coöperation of the secondary school. We have had considerable recriminations back and forth in certain parts of this country between the high schools and the colleges, each accusing the other of various and sundry education sins, such as, that the high schools do not prepare students for college. That is perfectly true, and there is no use denying it. I blame the high schools for trying to prepare every student for college. It is part of their function to select, to identify the few minds that are really going to profit by the type of education that is connoted by the academic curricula, and let the colleges know who these students are.

At the present time there are no channels of communication, even for the small amount of information that we now get on our students, up and down the educational ladder. Our students become increasingly strangers to their teachers as they progress from the first grade up to the university. That system seems to me to be wrong, wasteful, and unnecessary.

I have sometimes said that I thought teachers ought to give half of their time

to learning students, and then the remaining part of their time would produce ten times the good results they now achieve with 100 per cent effort at blind teaching, and most of our teaching is admittedly blind today. I don't suppose there is a teacher here or anywhere else who feels he knows more than one or two, or perhaps half a dozen, of his students as well as he would like to know them. The reason for that is that each semester the teachers have to begin all over again, with the yearly promotional plan which gives the students to different teachers each year. Each teacher has to start from the ground up to learn what the student's capacities and dominating interests are. That is one of the real reasons why most teachers have become, in spite of their own desire to the contrary, literally enforcers of a preconceived blanket prescription curriculum instead of the sympathetic guardians of struggling individual youngsters.

Here is another case which I would like to show because it contrasts so violently with the last one. This individual entered college two years older than the other student was when she graduated, took four full years to get through college, and her marks were generally rising. The indication of the registrar's record here is that this is a superior type of student, one that deans often say "has found himself." Actually, it is the case of the student finding the college, but it took three semesters to do that; which shows that all you have to do is to treat it, as President Lewis said, as so much college tree sitting. He says there is too much of that monkey business, and thereby hangs a long tale. (Laughter).

This individual did her tree sitting. Her record was four full years, so she got through in fairly good shape, but when she was confronted with this long examination she got a score of 212, which places her in the lowest one pe cent. The highest rating she gets is il mathematics because she got a zero, bu since 20 per cent got zero, we gave he 10 per cent for the benefit of the doub

Here I show you the results of testin with intelligence tests 26,000 high schoo seniors in May, 1928. Here they ar distributed according to chronologica age. Only two students out of 26,00 under age fourteen were permitted t graduate; only ten between fourteen an fifteen, and less than 250 under sixteen That is, less than one per cent of th students are allowed to graduate from high school under sixteen years. O course, that means that educationa guidance is sadly lacking. There shoulo have been at least 2,500 students under sixteen graduated at that time. The average age of graduation is eighteen

Up at the top here we have the aver age I. Q.'s of these different age groups Notice that the youngest groups had av erage I. Q's of 117, and the average comes down to 100. The average I. Q. of the whole state-wide group is about 105, which is the same as that found in the state-wide survey of New Hampshire high school seniors.

You notice again the same phenomenon that we found in the senior college grade. The younger students are brighter in spite of having had less formal training.

Here I show you one chart on achievement testing of these Pennsylvania high school seniors. The scores again appear at the left here from lower onés to higher ones, and each of these heavy vertical bars shows the range of scores of the middle half of the one-semester group, the two-semester, the three-semester, and four-semester groups. You notice that the one-semester group has an average at this point and then it goes down to two semesters of American history, and three, and four. So, apparently, the longer they study American

story the less history they know, and e less intelligent they are. (Laughter). Of course, that isn't the case. The planation is that taking one year of merican history is usually required, but e principals are allowed some discre-n in permitting some students to aduate with only one semester. They that under special conditions and be-use students have merits of other types. his shows that the principals' (on the erage) were not far off, because those ey permitted to graduate with only ie semester, being highly superior in telligence, were able to learn more merican history in one semester than e larger group did in two.

Of course these down here are re-aters, which indicates the futility of petition. Doctors, I suppose, may do at sometimes. If they find a certain urse of treatment makes a student orse, as in this case, they may repeat e treatment sometimes, but I don't hink they do. It seems to be bad policy nyway. This repetitional theory, which based on the old disciplinary doctrine, eems to me to be fallacious in theory nd disastrous in practice. If the stu-ents have failed once they are almost ertain to fail again, and hate it worse han they did the first time and there-ore remember less of it.

Here I show you the results of the econd college testing in May, 1930. I how you here the results on the sopho-nores of 32 colleges. Those were all hat were available when this chart was nade. Again, the same college, I think, ets the highest average score. Seventy-ive per cent of the sophomores in that ollege are above the average of the next ighest college and are above the state-vide upper quartile. The institutions down here have averages below the tate-wide quartile by a considerable nargin. It simply shows that accrediting nder the present scheme, however ben-eficent its influence is (and I believe those influences are very large and very favorable), does not insure parity of educational product.

It seems to me it would be very interesting for the Committee on Revision of Standards for Accreditation, if the Pennsylvania colleges would consent, to take the lowest six colleges down here, and the highest six, and see if they can discover the reason why, in spite of having the same accreditation, they should have such different products at the end of the course.

Here I show you the same 32 colleges arranged in the order of their intelligence test averages, indicated by this step ladder here. You get the same kind of distribution no matter what kind of tests you use.

Notice that the achievement records are indicated by these circles, and that above this point here the circles indicating total achievement on the college sophomore examination are generally below the intelligence marks, whereas down here at the lower end of the intelligence curve the achievement seems to be generally above the intelligence record. That is consistent with what we find in the grade schools also. We tend to pay these bright students the doubtful compliment of neglecting them, and tend to browbeat the dullards into at least simulating some degree of accomplishment.

One other interesting thing: Wherever you find a box at the top of the line, that indicates English, and an X at the bottom of the line at a given college shows it is a women's college. There are nine women's colleges here and, without exception, they are outstanding in English, and they are also outstanding in mathematics. (Laughter) Personally, I have always thought the women had better taste than the men.

In the reverse case, where you have an X at the top, meaning mathematics, and English at the bottom, you find it is a

man's college with a strong scientific bent.

Here I show you a chart with some hesitation. It is rather complicated, but just look at these heavy vertical lines rather than the lines for the individual colleges. This line represents the range of intelligence scores of the middle half of the students who got B. S. degrees in engineering. Their average is above the average line of the A. B. students, and that is above the average of the B. S. students, and that is a little above the average of the business administration and Bachelor of Philosophy group, and somewhat above the B. S. in education from universities, and also above the B. S. in education of the four-year teachers college curriculum group, and far above the two-year teachers college curriculum graduates.

I thought I would show you this briefly just to indicate that we have a great problem in recruiting teachers, successors in this complex business of handling our schools. I don't think it needs any more comment except to show, however, that we have very great variability even within these lowest institutions here. We have a heterogeneous aggregation of individuals who are serving their time and getting teaching certificates.

Here is perhaps the most striking chart, and I show it with even greater hesitation. Some of the tests we used in this Pennsylvania college sophomore testing program were also used by the Educational Records Bureau of New York City, which has about 200 private schools in its constituency. There are still some private schools operating in spite of the fact that "Jeremiah was Right." (Laughter).

The result of that circumstance is that we have results on the same test from the ninth grade up to the college senior class in six colleges at least, and in 54 private schools.

In the spelling part of the English test which I show here on this chart (and this is the only one I will sho although we could give you comparison on the basis of three or four other test in other subjects, including intelligence we find some difference between th ninth grade and the twelfth grade, bu not much difference thereafter. That is the freshmen, sophomores, juniors an seniors in college are not strikingly dif ferent on the average from high schoo seniors. In grammar you have the sam situation, and in punctuation it is th same situation — no change after th twelfth grade. In vocabulary, which i fairly close to an intelligence or genera learning capacity test, you have som difference between the ninth and twelfth grades, and then you have to come dow a few steps to reach the college fresh men and sophomores.

In terms of acquaintance with English literature, based on a 200 item sampling there is some growth apparent here. I shouldn't use the word "growth". I mean there is a difference between the ninth graders and the twelfth graders and then you come down to the level of these students from these particular six colleges. Please remember these are only six of the colleges of the state. Only six gave this test to all four of their classes.

Here is the total English test result based on 450 items.

As I say, I have no interpretation that I care to make of that chart. It might be very different if we had included all the colleges in the state, and especially if we had confined it to some of the outstanding institutions of the state. I feel quite sure that if we had confined it to the best six colleges in the state this line would have continued upward. These people here in spelling, grammar, punctuation and vocabulary have been doing some very good, consistent, tree-sitting.

I will just show you one case of a sophomore of last May, who was apparently saved by this college sophomore

amination. Notice his grades are all low average. Most of them are down re in the failing line, and all but one two courses had failures at the end the senior year. This student, I unrstand, was either dismissed from colge for poor scholarship or was put on obation or suspended. Yet when his port came in on this college sophomore amination it was found that he stood or near the top of the sophomores in at college. The dean asked us what to about this case, and we suggested that be readmitted. He consulted members the faculty who knew the student, and their advice and their report readmitd the student because they all said he as a very capable student and a very dustrious student who had done an mazing amount of reading, had worked the library constantly. The main reon for his low marks here was that he ought he could learn more outside class an inside class. (Laughter). The reults seemed to justify his judgment. (Laughter).

Here I come to what is perhaps the ost constructive part of the suggestions hat I have to make here tonight. This hows the inside of the cumulative record olders suggested by the Committee of he American Council on Education for se, after modification, by schools and olleges, and latterly an elementary chool form of this sort has been prepared for provisional use.

Notice the general plan of it is to put ll the information in annual calendar olumns. This first column is for 1922 nd it goes over to 1928. These narrow olumns up here on the gridiron represent calendar quarters. The advantage of this scheme is that you can read the history of an individual, graphically, at glance. You see things in their proper temporal relations, and it avoids the necessity of dating every item of information that you care to record about an individual.

After studying existing records for ten years, I find that one reason why they are so poor is that you have to write too much. Then they are almost impossible to read after you have written them. The relations between the data of different dates on the old type records are almost hopelessly concealed.

This case is one which happened to come to my attention in 1927, and unless I run over my time I would like to tell you the story rather briefly, in spite of the many times I have already told this story.

I will show you now, in an enlarged form, the upper portion of this chart.

This is one of those students who was rejected when he applied for admission to college in the year 1927. He was rejected primarily because he got a very low mark in the college entrance examination in English and because the estimate of his intelligence, which reached the college from the high school, was somewhat below average. All of the information that reached the college on this individual is represented in this line here of empty circles meaning grades on subjective college entrance examinations.

I happened to meet this lad about thirty minutes after he had been rejected by a college that had a long waiting list of applicants. I talked to the boy and with a gentleman who accompanied him, and I convinced myself at least that this was a good college risk. I learned what high school he came from, and found it was a high school that has been using objective and standardized tests once or twice a year ever since the Great War for all of its students that could be tested.

With the permission of the principal, I studied this boy's record folder, and it included about 100 different report forms and documents. I found they had a very complete story right there in the high school files on this one individual. The only trouble was that it was set up

in such form that no principal who ever did any other work could possibly have time to go through this folder of records, and certainly no college admission officer could ever take time to go through such a voluminous record. But I took that record folder and reduced it to this one page, which I think gives a fairly readable record.

I found, among other things, a record of about ten different intelligence tests in that file. I plotted them here against standard norms and found that they were all in the highest three or four per cent and averaged very clearly in the highest one per cent.

There are some differences here between individual tests due to the inherent unreliability of any single test. No test of any form has ever been devised, and in my belief never will be devised, that alone is worthy of the complete confidence of any educational guidance expert. But when you have the results of eight or ten tests stated in comparable units over a period of five years or more, you can feel considerable confidence in the indications.

Here this boy is certainly in the highest one per cent, so far as intelligence can be measured by the usual type of intelligence test. That indication is especially worthy of confidence when it is confirmed by the achievement tests which are scattered over the top of this chart.

Here in geography they had four tests all in the highest two per cent. In English I plotted about eight or ten different measurements, and they average in the highest five per cent. Here is the French test that goes up to the top and stays there for four full years. Here is general science, biology, physics, and chemistry all above the average. The only things in which his averages were low were drawing, height and weight, Stenquist mechanical test, and handwriting. The boy's writing was almost illegible. I have great sympathy for him. (Laughter). That is how I account for his failing grade in his college entrance English examination. The examiners follow the announced policy of considering the individual guilty until he proves himself innocent. That is another revision of the American Constitution. Since they couldn't read his writing they flunked him instead of reporting no examination.

Here is what appears to be a trend developing in this student's growth. In arithmetic in junior high school he starts out very well. When he gets to algebra he comes down to the average. He repeats and coaches and gets his algebra up, and then he takes plane geometry and comes down to the lowest 20 per cent, and a year later when he takes a general objective examination in algebra and geometry he is still in the lowest 20 per cent. That means you have either a lack of ability or lack of interest, or both, in mathematics in this boy, and there is no reason why he should learn mathematics anyway. Very few of us could now pass the test that we prescribe for our tenth graders.

Here is one dot on this chart which seems to me especially significant. It is labeled "Spanish." It means he had a standard test in Spanish at that time. There is no line preceding that dot, which means that he took this test without having had any course in Spanish in high school.

The story connected with that examination is this: A year before the boy actually graduated, that is, when he was a little over fourteen years of age, he decided he would like to go to college. His teachers told him he couldn't do it because he didn't have enough credits. He asked what credits were but they couldn't tell him. For fifteen years I have been trying to find out what credits are, and they seem to be financial liabilities. (Laughter). The student was told, however, where he could get some.

got some money from his father and
t to apply for an examination, and
of the first questions they asked him
how many years he had studied
nish and in what high school, which
nds me of the question the Parole
rd of New York asks of any crim-
who is seeking parole: "How much
have you done, and in what hoose-
?" Otherwise, the first question
ld have been, "How much Spanish
ou know? What are you going to
with it? Are you really interested in
Are you going to use it in a way that
make you a better member of society
happier member of society?" Not
They wanted to know how long he
done time and where, and under
t police supervision.

bout a month after he was rejected
n this office for annoying busy peo-
with foolish questions and irrelevant
tions for examination, the teachers
is school received copies of the then
American Council language tests
ch had been made by the Modern
eign Language Study. It occurred
is French teacher to try this boy out.
took a ninety-minute test and finished
about thirty or forty minutes, and
n his score was compared with the
ilable norms he was in the highest
e per cent of third year Spanish
dents. (Laughter).

lease bear in mind that I realize this
n exceptional case, and I am not try-
to generalize from exceptional cases.
when we can make such a grievous
take with such an outstanding case it
ms to me that the number of mistakes
make with other cases less outstand-
must be quite numerous and almost,
ot quite, as tragic as this one might
e been.

will show you the rest of his record
you can see how this type of record,
faithfully filled out, can give you a
ll-rounded picture of an individual.
lound notes in this folder about this boy, recording several stunts that he had done. I picked out four as being typical. All of them related to literary stunts. Here the English teacher reported he had done a great deal of study on Shakespeare and that he had written an essay on "Shakespeare in Politics." She thought it worth reporting because it was so well documented. The essay showed the boy had read a great deal on the period of Shakespeare.

Here he read some French authors in the summer without having been told to do so, and passed a good oral examination on them.

Here he had translated during the summer, without being told to, three short French comedies into English. Just think of the difficulties some college students have in translating fifteen lines a day, or ever wanting to do that much.

Here in his last year the English and the French teachers reported independently that this boy had written a manuscript of about 200 pages on the subject "Geography and French Literature," and had written a very well documented and very interesting essay.

The whole record shows that you have here an individual who not only has the capacity for scholarship but has the initiative and the independent habit of study which we, in our announcements, claim is the primary objective of the college experience. As a matter of fact, we refuse to recognize work if it is done independently and outside class without orthodox supervision. The attendance rule is at least half wrong.

I won't take time (I see I am running over) to show you the rest of this record, but it gives a fairly complete picture and shows with respect to information on each item cumulative results which make the general indications much more reliable than if you were depending on a single interview or snapshot report.

Here you have, over a period of four or five years, subjective reports on the

personality of the individual which are thoroughly consistent. You can therefore depend on it that this boy is shy, the introverted type.

To complete the story, the lad was sent to Europe about the middle of that winter, and I understand from latest reports he is about to get his higher degree over there this winter or next year. There they seem to welcome scholars, even if they are young, or whether they have fulfilled formal requirements or not. This sort of thing, I think, will happen less frequently hereafter both in our high schools and in our colleg

The plan announced recently by University of Chicago seems to me to one of the greatest events in educatio history in the last two or three decad perhaps more decades than that. Ma colleges have been trying to do that s of thing and the way is not yet perfec clear. There are still many difficulties be surmounted, but the ideal, it seems me, is worthy of the best efforts th this Association, both the college a high school divisions, can give it.

Class Size Standards at the College Level[1]

Earl Hudelson
West Virginia University

The Situation

The American public has taken the advocates of higher education at their word and has responded with armies of its sons and daughters that have taxed to the utmost the facilities and resourcefulness of our institutions of higher learning. Unprepared for the onslaught, they sought immediate relief in the obvious expediency of enlarged teaching staffs; but while faculties were increasing 350 per cent enrollment was increasing 450 per cent. Making virtue of a necessity, colleges and universities gradually yielded to the pressure by increasing the size of their classes. They first reluctantly abandoned their position to freshman hordes; then, after a few futile rear-guard skirmishes, capitulated to sophomores. In colleges with meager curricula, classroom sections have been kept fairly intact in the upper years; but institutions that maintain policies of election and differentiation are hard put to it to finance their necessarily small advanced classes without reducing the expense of freshman and sophomore courses by offering them to large student groups at a time.

Parents, therefore, who are still determined that their sons and daughters shall attend college where classes are small and where teacher-pupil contacts are frequent and intimate will do well to inquire beyond the outworn slogan on the president's letter-head; for the strategy of boasting of limited enrollment and small classes to attract more students to be taught in bigger classes has succeeded. Ever-expanding knowledge, the present fervor for it, and extension of the necessity of expensive specialized training down into the semi-skilled vocations, on the one hand, and the inability or reluctance of American society to finance these costly demands, on the other, have imposed such a burden on college administration that it is questionable whether students who are getting those intimate, personal pupil-teacher contacts are getting much of anything else. Yet society insists upon the right of its sons and daughters to the opportunity of higher education; and colleges, be they public or private, feeling the obligation to meet the demand, are doing their best with the limited resources at their disposal to provide higher education of quality in quantity. Colleges that scarcely a decade ago were struggling for students are now struggling with them, and their curricula are being combed for more and more material that can be taught to large groups in order that funds may be available for enough instructors to teach the rest of the material to small groups.

There is evidence that from the mere standpoint of numbers the crest of the wave is near. The curve of growth of entering enrollment is leveling off. This, however, is not relieving the financial stress, for the abatement is at the cheaper end of the line. College students are persisting longer and graduate-school enrollment is increasing rapidly. This means more and more expensive specialized training; and colleges are being forced to offer junior-college courses to larger groups at a time in order to finance highly differentiated elective courses

[1] This paper was prepared at the request of the officers of the Commission on Institutions of Higher Education and is sponsored by them.—The Editor.

for necessarily small groups in the upper and graduate years. Under present standards of financial support and current trends in student persistence, the institution that maintains junior-college class sections of moderate size must have either an enviable endowment, a meager curriculum, or advanced classes so small as to be practically prohibitive. Only by offering elementary courses to large student groups can that degree of specialization be afforded which is commonly considered the prerogative of upperclassmen and graduates in a modern university.

There is a good deal of popular misunderstanding about the relative size of classes in public and private institutions. People with whom small classes are a fetish point to state universities in holy horror and pray that their children and their children's children may be spared the paradox of mass education. As a matter of fact, even in 1928, as Table I reveals,[2] there was a higher proportion of classes under eleven in size in state universities than there was in privately endowed colleges; and if the lecture portion of part-lecture courses be excluded, the average class size in state universities was lower than that in privately-endowed colleges. There was also a higher percentage of large classes in state universities; but the abundance of small classes held the average down to 18.6, whereas the average in private colleges was 19.6. The big-class reputation of state universities usually arises from a few courses in which several recitation sections are combined for lectures once or twice a week. The same policy maintains in most private institutions, the main difference being that the lecture groups in state universities are larger because more students are enrolled.

In some colleges and in most universities small classes are as serious a problem as large classes are. This is usuall due to election and differentiation, bu frequently it is the result of what ma well be over-attenuation of subject-ma ter. The natural sciences, engineerin and agriculture are the outstanding ex amples of minute specialization. Thi together with their prevailingly sma laboratory sections and their necessaril expensive laboratory facilities, makes in struction in these departments relativel very costly.

Specifically, the class-size situation i the various types of higher institution of learning is as follows:

In privately-endowed colleges and uni versities there is a marked two-fold tend ency; namely, smaller recitation section and larger lecture sections. Schools wit comfortable endowments are organizin very small recitation-discussion group patterned more or less after the Oxford Swarthmore system. Many of thes same schools are meeting the increase cost of this expensive innovation by on ganizing larger lecture groups and b offering more of the work by the lectur method.

In state universities the already larg number of highly specialized courses i gradually increasing. There are rela tively fewer basic-course classes from 20 to 30 in size and more from 40 to 60 Here also the tendency is to offer mor of the work in the form of lectures, bu the very biggest lecture classes are being divided into merely large lecture groups

Due to the high proportion of labora tory-shop courses and to prescribed cur ricula, class size in state colleges and technological institutes is pretty well con trolled and relatively conservative.

Most public junior colleges, being young, are not yet seriously confronted by the class-size specter. Those that are are following the way of all flesh. As many private junior colleges are striving for students as are striving with them

In general, class size in normal schools

[2] From Hudelson, E. Class-Size Conditions and Trends at the College Level. *School and Society*, 30: pp. 98-102, July 20, 1929.

d teachers colleges depends upon enllment. Until recently the decimation ter the first two years was so great to render many of these institutions rtually junior colleges; but as rapidly they assume the rank of degree-grantg institutions they tend to increase the erage size of their freshman and soph-

in two large classes or in four small ones, they might manage to handle larger sections. They tend to become more charitable toward large classes as their experience with them grows, especially if they receive administrative coöperation in the form of lighter teaching schedules and clerical or instructional assistance.

TABLE I

COMPARATIVE DATA ON CLASS SIZE IN 386 COLLEGES OF VARIOUS TYPES IN 48 STATES. 1927–28

	Average Size of All Classes	*Average Class Size**	*Per Cent of Classes Over 30 in Size**	*Per Cent of Classes Under 11 in Size**
5 privately-endowed colleges and universities in 40 states	22.7	19.6	18.1	25.8
state universities in 28 states	25.2	18.6	24.0	34.0
state colleges in 12 states	22.7	16.5	12.2	25.5
public and private junior colleges in 25 states	22.1	22.1	8.0	17.5
degree-granting state teachers colleges in 27 states	26.0	19.8	13.6	26.2
non-degree-granting state teachers colleges and normal schools in 28 states	31.5	30.35	?	?

* Exclusive of the lecture portion of part-lecture courses.

more class sections in order to make eir funds stretch over the four years. f these institutions succeed in their camaign for authority to offer graduate ork, and it is bona fide graduate work, ey may confidently be expected to inease still further the size of their undergraduate classes.

ATTITUDES

Large classes are generally unpopular among college teachers; yet a majority f them confess that if they were paid on tuition basis or if they had the option f teaching an equal number of students

But even the most generous of them maintain that while large classes may be administratively expedient they are probably never educationally advantageous. The stock contention is that large classes preclude personal pupil-teacher relationships and, though more stimulating, are physically and emotionally more enervating.

College students are prevailingly and often vociferously opposed to large classes; though they, too, tend to become more tolerant with experience. Those of them who have known only conventional methods of college classroom pro-

cedure cannot visualize a large-class situation in which an individual is more than "a number in a blue dress." Their chief objections to large classes are (1) lack of personal contact with, and individual attention from, the instructor, (2) the embarrassment of having to shout to be heard, and (3) lower marks. Inherent in the testimony of many capable students, on the other hand, is the implication that their weak sisters prefer small classes because of the better opportunity which they afford of substituting personal appeal for intellectual accomplishment. Quizzically enough, college students do not tend to take advantage of increased opportunities to initiate conferences with their instructors. They seem to be satisfied with the mere privilege.

In view of the mutual opposition toward larger classes on the part of teachers and students, it is only natural that this attitude should be reflected in the homes of the students. Parents, moreover, who have had college experience had it when and where class size was not a problem and where any method was personal and every contact intimate. Whatever else our fathers knew, they knew their professors; and now their universal desire is to have their children know *their* professors and their professors know them.

There is a deep and widespread doubt among college and university administrators concerning the practical wisdom of the arbitrary class-size standards imposed by accrediting agencies. They contend that such inflexible regulations "have all the effect of arbitrary limitation on output, such as is adopted and enforced by labor unions, with the consequent tendency to estop that searching and inquiry after better methods."[3] Many claim that class size is too negative a factor in educational efficiency to warrant such relentless control over it and that the welfare of both teacher and student can be adequately safeguarded by pupil-hour-teaching-load limitations. Others assert that the special privilege of maintaining large classes "in subjects suitable to the lecture method of instruction breeds subterfuge. The complaint that "we small fellows are held to the letter of the law of accrediting associations much more rigorously than are the larger institutions" occurs with arresting frequency.

The fact that these sentiments are generally strongest among administrators who are most harassed by high enrollment and low funds suggests a tendency to rationalize; yet equally vehement protests are voiced by administrators who could double their average class size without violating accrediting standards. Inherent in the minds of many college and university executives are the convictions that optimum class size depends on the purpose of the course, the nature of the subject, the maturity of the students, and the special skills and attributes of the teacher; that these conditioning factors can be determined and evaluated only by local agents and means; that the inevitable exigencies of a situation do and should control class-size practices; and that standards, to be reasonable, must be determined experimentally. They grant that what may be needed is a complete breaking away from tradition and the devising of instructional procedures suited to the demands of modern higher education; that the generally coercive policies which prevail in colleges and universities may actually be doing injustice in the name of education; and that to the degree that education is less a matter of telling students what and how to do and more a matter of encouraging and guiding them in learning to do for themselves, large classes may prove to be ideal educational situations.

To the protestation that a teacher's

[3] From a letter from the president of a college whose classes are well within the limits set by accrediting associations.

e success as a teacher is to be meas-
ed not in terms of what he actually
ches but by the subtle, far-reaching
luence which he sheds upon the char-
ers and lives of his students comes
challenge from many an administra-
that if this be true, then the insti-
ion that is fortunate enough to have
ch a teacher is morally obligated to see
it that as many of its students as pos-
le come under that teacher's spell.
rtainly most of them will be denied
s privilege if he teaches only small
sses. As for the other kind of teacher
the kind who merely teaches, the kind
o lacks that ineffable aura which
rmeates character and directs lives—
is no more devoid of it in the presence
large classes than small ones. If
ything can inspire and translate him
ge audiences will.

College administrators are about evenly
vided in their opinion as to the year or
ars in which it is most desirable for
sses to be small. Half of them claim
at students should be taught in small
oups *until* they learn how to study,
hile the other half contend that stu-
nts should be ministered to in small
oups *after* they know how to study.
ractically, their opinions matter little,
nce the pressure of enrollment, and not
olicy, is usually the determining factor.

EVIDENCE

The tide of popular fervor for higher
ducation immediately after the war
aught our colleges and universities un-
repared and disturbed their complac-
ncy but gave them no time for studied
adjustments. Administrators were sud-
enly confronted not with an old theory
ut with a new condition. What was done
as done not because it was felt to be the
hing to do but because under the cir-
umstances it was all that could be done.
Faculties were augmented till funds were
xhausted, then classes were enlarged to
bsorb the overflow. It was looked upon as a makeshift fraught with dire consequences, but it would have to do till the hysteria subsided or till inoffensive methods of student selection could be devised.

While faculties generally were dolefully meditating upon means of restoring the old order, here and there an ingenuous and inquisitive instructor had the impertinence to make some modest comparisons and the effrontery to announce his results. Desperate administrators got wind of these heresies and noised them about. Other teachers, sensing their simultaneous obligations to their students and to the state or seeing in large and fewer classes the possibility of lighter teaching schedules and more time for self-improvement and research, set up controlled class-size experiments and braved the consequences of publishing the results.[4]

The earliest of these controlled and recorded experiments with class size at the college level was that by Edmonson and Mulder[5] in their course *Introduction to High School Problems* at the University of Michigan during the first semester of 1922-23. A small section of 19 students was paired on the basis of intelligence with an equal number of students in a section of 124. Studied efforts were made to adapt teaching procedures to the size of the class. Achievement was measured by occasional essays, short objective tests, and mid-semester examinations. The same assistant evaluated all papers. Students with teaching experi-

[4] Immediately after the writer had published the results of his first experiments on class size he received this admonishment from the dean of a professional college in a large state university: "Lay off of that class-size stuff. If the public gets the notion that we have been wasting money on small classes it will suspect that we are squandering our resources in other ways. Once the public loses confidence in us, there will be the devil to pay."

[5] Edmonson, J. B. and Mulder, F. J. Size of Class as a Factor in University Instruction. *Journal of Educational Research*, 9: pp. 1-12, January, 1924.

ence or previous knowledge of the tests were eliminated from the paired groups.

The range and the distribution of scores for the paired students were similar. The small section showed a superiority of 2.8 out of 100 on the essays, while the large class excelled by 1.4 out of 94 on the objective examinations. Subjective reactions were also solicited from all members of both groups. Every degree of preference was registered by each class, the net advantage accruing slightly to the small section. Five students were transferred from the large to the small class late in the semester and were asked to record their impressions of the relative efficiency of the two groups. They felt that the atmosphere and procedure in the small class were more conducive to learning and that the teacher-student relationship was more personal.

Mueller[6] conducted a controlled class-size experiment during the same semester at the Worcester, Massachusetts, State Normal School in introductory psychology. Thirteen kindergarten teachers-in-training in a class of 20 were paired on the basis of intelligence with 13 elementary school teachers-in-training in a class of 80. The same instructor taught both sections by as nearly the same methods and under as nearly identical conditions as possible. On an objective test administered at the close of the term the paired members of the small section excelled their mates in the large class by 17.5 per cent. In spite of Mueller's obvious prejudice for small classes and his tendency to draw inordinary conclusions, his results would be significant were they known to maintain for a convincingly large number of cases and were it necessary or reasonable to subject every size of class to identical classroom treatment. By the questionable expediency of comparing his findings with those of Edmonson and Mulde Mueller concluded that efficiency may b expected only in classes somewhere be low 45 in size.

Miss Grupe[7] reports a class-size ex periment in psychology at the Ellensburg Washington, State Normal School wit sections of 23 and 48. Nineteen mem bers of each group were matched on th bases of sex, intelligence, and high schoo records. Instructor, content, and teachi ing methods were constant factors Achievement was measured in terms o scores on notebook work and objectiv examinations. Results were computed in terms of A. Q.

The paired women exceeded expect ancy by three points in the large class and by one point in the small. The paired men just attained expectancy in the large section and slightly exceeded i in the small. The average achievement of the paired students was representative of that of all students, paired and un paired.

Still another controlled experiment in introductory psychology was that by Taylor[8] at the University of Oregon. A homogeneous experimental section of 36 students was conducted by one teacher on an independent-study plan; two control groups, 37 and 104 in size, followed the customary procedure of lectures and classroom instruction under three different teachers serving alternately; while a fourth section, consisting of 36 students, had one instructor throughout and pursued a plan of informal discussions and problem solving. Members of the various sections were matched as to sex, previous knowledge of the subject, and percentile rank in general college ability.

[6] Mueller, A. D. Size of Class as a Factor in Normal School Instruction. *Education*, 45: pp. 203-207, December, 1924.

[7] Unpublished report.

[8] Taylor, H. R. An Experiment with Independent Study. In Douglass, H. R. and Others: *Controlled Experimentation in the Study of Methods of College Teaching*. Eugene, Oregon: University of Oregon Publication, Education Series, Vol. I, No. 7, February, 1929, pp. 300-312.

The results showed no significant relationship between size of class and efficiency of instruction; if anything, evidence favored the big class. Even the small discussion group, led by the same instructor throughout, failed to show any superiority over the group of 104 equally capable students taught by formal lectures delivered by three instructors.

At the University of Texas, Holland[9] experimentally studied the effects of the size of lecture sections on scholastic acquirement in educational psychology. Each of the two instructors had four sections ranging in size from 26 to 112. Other factors were so controlled that size of class was the most influential suspected variable. Criteria of accomplishment were the scores on seven objective tests and a final examination. The results indicated that the efficiency of the lecture method was not affected by the size of the class. The critical factor appeared to be not class size but student intelligence.

President Emeritus Kirk's personal experience with paired groups of 36 and 0 students in educational psychology at the Kirksville, Missouri, State Teachers College during the fall term of 1928 convinced him that there are no insurmountable obstacles inherent in large classes. He based student marks on his impressions from personal contacts and on oral class efforts, drawings, and other exhibits, ten-minute written tests, full-period essay-type tests, oral and written reviews, and mid-term and term papers. Results were slightly in favor of his large class. "There were ample means," he reported, "of keeping up and accelerating the *esprit de corps* in both classes."[10]

Marinoni[11] conducted a controlled two-semester experiment in beginning Spanish at the University of Arkansas. During the first semester the set-up consisted of groups of 26 and 43, both taught by the same instructor. Pairing was based on the scores made on the Iowa Placement Examination for Foreign Language Aptitude. On a 235-point final examination the average score of the paired members of the large class was 155.9, while that for their mates in small class was 156.2. This difference is statistically insignificant.

Scores on the final examination of the first semester were made the basis of pairing for the second-semester experiment. Groups of 13 and 45 were again handled by the same instructor. Achievement was measured on a 93-point final examination chiefly objective in character. The average score of the paired members of the large section was 52.2, as against 51.2 for their mates in the small section. Again the difference is inconsiderable.

Marinoni is of the opinion that the teacher's vigor and enthusiasm are the determining factors. Extra paper correction constituted his only additional burden, the strain and labor in the large class being somewhat less than double that of a group half its size.

According to an analysis of class size relative to the achievement of 6,667 students in first-year college chemistry, made in connection with the 1927-28 survey of conditions and practices in twenty-eight Land-Grant colleges, the critical point in class size lies somewhere between 20 and 40. Beyond 50 or 60 it does not seem to matter much how big a chemistry class becomes.[12]

---

9 Holland, B. F. The Effect of Class Size on Scholastic Acquirement in Educational Psychology. *School and Society*, 27: pp. 668-670, June 2, 1928.

10 Kirk, John R. A Study of Class Size, Teaching Efficiency, and Student Achievement. *Phi Delta Kappan*, 12: pp. 59-61, August, 1929.

11 Marinoni, A. and Prall, C. E. Unpublished report, University of Arkansas, Fayetteville, Arkansas.

12 Moss, F. A. and Others. Impersonal Measurement of Teaching. *Educational Record*, 10: pp. 40-50, January, 1929.

This evidence involved no controlled experiments and its value is merely that of any similar survey.

Miss Rogers[13] conducted an experiment in freshman English at the University of Arkansas with five control sections, ranging in size from 25 to 30 and taught by four instructors, and one experimental section of 45 students. Pairing was based on the scores made on the American Council on Education Psychological Examination and on percentile rank on an English training test battery, with triple weight on the latter.

Five separate examinations were administered late in December. On three of these—grammar, punctuation, and sentence sense—the average score of the paired students in the large experimental section was significantly above that of their mates in the control classes. In theme-writing ability the ratings were virtually identical. On an experimental test of ability to judge between good and poor writing, results slightly favored the large class.

During the second semester the average composition scores of the paired groups were practically identical, scores on a literature interpretation test favored the small classes, and the results of a paragraphing test probably favored the small classes slightly.

Since 1923 the University of Minnesota has conducted a protracted series of controlled and quantitatively measured experiments on the relation of class size to educational efficiency.[14] By March, 1929, the investigation had involved nearly 8,000 students in 67 experimental units (i. e., 67 large classes and 67 small classes) in 18 courses under 30 instructors in 12 departments of 5 colleges. The size of classes has varied in ratios of from 2 to 1 to 12 to 1, the smallest section consisting of 8 members and the largest of 336. Various changes have been rung on instructors, methods of teaching, content, classroom management and class organization in attempts to isolate the critical factor or factors in the relative efficiency of classes of different sizes. Pairings have been made on the bases of sex, intelligence, and past scholarship records. Results were measured by means of objective tests and examinations, quizzes, and instructors' marks.

In four experimental units out of every five the paired students in the large classes have excelled their mates in the small (See Fig. 1). In 50 per cent of the units the superiority of the large classes was statistically significant, whereas small sections significantly excelled in only 5 per cent of the units. At every intelligence level and at every scholarship level the paired students in the large classes have tended to outstrip their equals in the small sections. Under only one of the thirty participating instructors did the small classes consistently and significantly excel the large.

Comparative distributions were also made of marks in the large and small sections of five populous freshman courses over a period of six years. The marks were slightly favorable to the large classes.

Three of the experimental units were in college physics, with classes ranging from 12 to 336 in size. Though the cost of instruction in the small sections ran from three to eight times that in the large sections, achievement was consistently higher in the latter.

In connection with a survey of the University of Chicago, Beauchamp[15] in 1930 and 1931 conducted a controlled

[13] Rogers, Mabel and Prall, C. E. Unpublished report, University of Arkansas, Fayetteville, Arkansas.

[14] Hudelson, E. *Class Size at the College Level.* Minneapolis: University of Minnesota Press, 1928.

[15] Beauchamp, W. L. The Relation of Class Size and Methods of Instruction to Educational Efficiency at the Senior College Level. Unpublished report, the University of Chicago, 1930.

and carefully analytical investigation in his course *Methods of Teaching in Junior and Senior High School* (1) to determine the relationship of class size to the educational achievement of students under similar teaching procedures and (2) to discover the effects of certain variations in teaching procedure upon educational achievement.

Beauchamp first compared the achievement of matched students in sections of 27, 45, and 105 over the same content and under similar teaching procedures, and got no significant differences. By introducing expensive maternalistic methods in the two smaller classes he was able at times to bring them through significantly ahead of the big class in achievement on tests over units of the course. Variability was generally a little wider in the large section. On the final examination, however, no appreciable advantage accrued to any one of the three classes, either in achievement or variability.

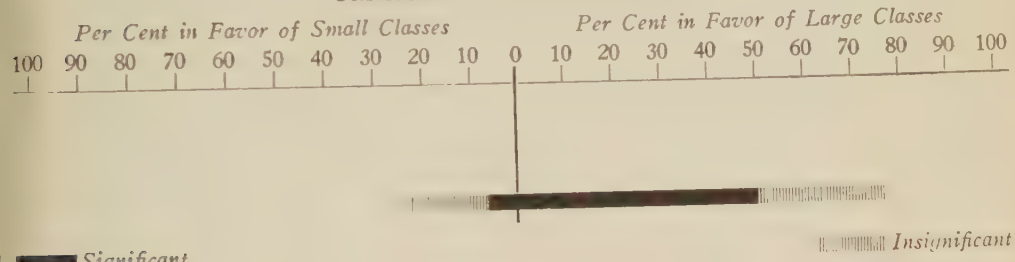
At the end of Unit I, at the end of Unit II, and at the close of the course each member of each section was asked to rank all of the courses he was then pursuing as to (1) relative amount of time spent in preparation, (2) relative intellectual challenge, (3) relative interest, and (4) relative benefit. At no time did either size of class or method of instruction affect the relative rank of any of these factors.

In general, the advantages of the costly modifications in teaching procedures accrued mainly to the weakest members of the class; when pairing was based on past scholarship alone the differences in achievement tended to disappear. In other words, the weak students in this experiment were weak not because of the size of the class but because they were weak anyway. Time-consuming personal conferences with floundering students, though emotionally satisfying to them, were of doubtful value in terms of achievement.

Finally, Remmers[16] reports a controlled experiment with class size in educational psychology at Purdue University during the first semester of 1930-31 in which the achievement of 97 students, taught in sections of 36 to 40 by the customary recitation method, was compared with that of an equal number of matched students taught in one section of 150 by the lecture-quiz method. Pairing was based on sex, school affiliation within the university, and average percentile score on the Iowa Chemistry Aptitude Test, the Iowa Mathematics Training Test, the Purdue University

FIGURE I

RESULTS OF 67 CLASS-SIZE EXPERIMENTS
UNIVERSITY OF MINNESOTA, 1923-29



[16] Remmers, H. H. An Experiment on the Relative Effectiveness of the Lecture-Quiz and the Recitation Methods of Class Instruction in Elementary Psychology. Unpublished report, Purdue University, Lafayette, Indiana. 1931. Remmers reports that the experiment is being repeated this year (1931-32) with an experimental group of approximately 170.

English Placement Test, and the American Council on Education Psychological Examination. Achievement was measured in terms of scores on objectively-scored tests, daily written work, and an essay type of examination. Students' attitudes toward the instructors and their methods of instruction were canvassed and analyzed.

The six control sections met three times a week, each under the direction of one instructor throughout. The big class met twice a week for lectures and was divided into four sections once a week for a quiz. Each of the four instructors who conducted the quizzes was responsible for one-fourth of the lectures. Due to holidays, the experimental group met three fewer times than did the control sections.

Despite the fact that student attitude veered heavily toward the small-class procedure and instructors, the large group slightly excelled in average achievement. The large class organization and procedure, had it been applied to the total membership of the course, would have effected a financial saving of approximately fifty per cent.

CONCLUSIONS

That, then, is the reported evidence on the relation of class size to educational efficiency at the college level. To the degree that the early college years are fundamentally secondary in nature, the numerous class-size experiments at the high school level might appropriately have been included in the review; but there was no point to doing this because they tell the same story.[17]

Everything considered, the conclusions are inescapable that:

1. Under prevailing methods of college instruction and classroom management, class size bears no significant relationship to educational efficiency as measured in terms either of student achievement or of any other mensurable outcomes.

2. The only instructional procedures that have appreciably and certainly increased student accomplishment in small college classes are so costly in money, time, and labor as to be virtually prohibitive in large classes and, in view of the relative nature of educational efficiency, of doubtful justification in any size of class.

3. Most of the advantages of expensive small classes and maternalistic methods of instruction accrue to the weakest students. It is a fair question whether the use of oxygen, spoon-feeding, and nursery coddling to squeeze faltering students through college courses is a compliment to either small classes or higher education.

4. The only assured effect of frequent and intimate teacher-pupil contacts is personal satisfaction.

5. If education should be a leveling process, with a premium placed on mediocrity, then small classes are, by and large, desirable; but if pupil differentiation is a commendable aim it appears to be more attainable in large classes.

6. There is no evidence to show that, native ability equal, students learn less under modern college conditions than they did when classes were small, methods personal, and relationships intimate.

7. If there are advantages accruing, or even accruable, from small classes that cannot be made to accrue from large classes they have yet to be experimentally established.

IMPLICATIONS

If the same standards be applied to educational efficiency that are applied to other kinds of efficiency it is hard to see

[17] The most comprehensive reviews of class-size experments at the secondary-school level are to be found in Hudelson, E. *Class Size at the College Level*, chapter ii, and in Smith, Dora V. *Class Size in High School English*, chapter ii, both published by the University of Minnesota Press, Minneapolis. See also this QUARTERLY for September, 1929, pp. 196-208.

now the imposition of class-size limitations can longer be defended. However conoclastic the evidence may sound, students in large college classes actually tend to achieve as well as, if not better than, do comparable students in small classes; and there is no evidence to prove that outcomes other than achievement suffer in large classes.

It thus appears that an already overburdened society is paying an enormous tribute to uphold a mere academic tradition. In view of the many worthy and pressing claims upon educational support and the more feasible means of safeguarding the interests and welfare of both students and teachers, it would seem to be false economy to continue to worship this impotent small-class fetish.

If efforts to salvage inherently weak matriculants is a proper concern of colleges and universities, they may reasonably be required to handle such incompetents in groups small enough to permit of individual, maternalistic treatment. As for competent students, their welfare can be adequately safeguarded through such administrative controls as differentiated curricula and assignments, satisfactory library facilities, methods of teaching adapted to the aims of higher education and adjusted to the results of reliable diagnostic testing, clerical or instructional assistance, and teaching schedules and total teaching loads that will insure time and energy for profitable, constructive teacher-student contacts. With these factors rationally supervised and compensatively accredited, class size may safely be allowed to be adjusted to the exigencies of each local situation.

Reorganization of Secondary School Curricula[1]

JOHN E. STOUT
Northwestern University

The Commission on Units of Curricula of the North Central Association, through a committee on the reorganization of secondary curricula, has been attempting to secure the use of certain standards in the valuation of present curricula material to the end that fruitful revision may be secured. It is the judgment of the writer that this committee has made significant contribution in directing attention to this important educational task, and has secured appreciable results in evaluations, and in less degree in actual revisions. This committee has held, throughout its history, the designation "The Committee on the Use of Standards for the Reorganization of Secondary School Curricula," and at the meeting of the Association in 1931 the question was rather sharply raised whether the committee had not reached the point where it should definitely make recommendation for the actual reorganization of curricula through the use of the standards proposed. At this meeting a sub-committee was appointed to work out a plan of procedure and to report at the next annual meeting.

During the last ten years the functional point of view, theoretically at least, of secondary school curricula has been gaining increasingly wide acceptance throughout the North Central territory, but until recently little or nothing has been said or done to secure reorganization of curricula on the functional basis rather than on that of subjects. Curriculum offerings and requirements are all on the basis of specified subjects, classified in accordance with traditional practice. We offer so much algebr geometry, English, history, science, a in terms of semester or year units, an requirements are in the same terms. I the organizations of subjects into cur ricula their captions are largely in term of subjects or fields, such as Englis science, history and the like, and her is where one of the chief difficulties lie in securing thorough-going functiona evaluation as a basis for the fundamen tal revisions required to meet functiona standards. It seems, therefore, that th question raised at the last meeting o the Commission on Units and Curricula is a pertinent one, and that the actio of the Commission was timely in au thorizing a special committee to under take the task of suggesting a procedure for the application of standards in such way as to secure a reorganization of curricula on a functional basis.

The four ultimate objectives, *health; use of leisure, vocational intelligence and preparation,* and *disposition and ability to sustain social relationships,* and the results of their analyses have been set forth from time to time in reports of the Committee and types of the material suggested in the various subjects. Emphasis has been placed repeatedly on the quality or kind of material required in view of the standards applied in selection, but in those cases where revisions have been attempted it has always been done within the limitations of subjects as such, and the results secured were evidence of this same limitation. The proposal now is to divest ourselves of these limitations and let the functions (corresponding with objectives) determine what subject matter and activities shall be included in a unit.

[1] A paper read before the Association at the time of its annual meeting in Chicago, March, 1931.—The Editor.

The obvious result of reorganization on such a basis would be that we shall have one or more units corresponding to each of the objectives; namely, *health, use of leisure, vocational intelligence and preparation,* and *social relationships*—and the *units would be so named.* In proceeding to select material for any one of these units we are not limited to any subject or field but may select from the whole range of available subject matter and activities. An example of this procedure is found in the elementary school where units are offered which are called *health.* In the secondary school, however, we feel bound to call the unit science, and even if we are offering a course in physiology, all material must maintain its respectability by conforming in kind to the traditional requirements for membership in that particular branch of the science family. Another step taken in the elementary school has not gone the entire distance of securing functional organization but has resulted in breaking down barriers between types of subject matter which by every educational right belong together. For example, the organization of units in *social science,* in which are found material from history, geography, and other allied subjects, are examples of this accomplishment.

Examples of the influence of the subject or field point of view are found in the attempts to reorganize units resulting in unified mathematics and general science. In the former the subject matter remains essentially the same as if we had continued to teach arithmetic, algebra, geometry, and trigonometry as separate units, no significant eliminations having been made or new material introduced. A course in science means essentially that the student will have the same kind of material and taught from the same point of view as would be the case did he study the several sciences. About the only difference is that the amount of material in each science is considerably less. In fact, the authors of a number of these text books in their prefaces state that the purposes of the course are to acquaint the student with the *scientific method* and to permit him *to find out which one of the sciences he wants to study.* There are, to be sure, exceptions to this general statement, but on the whole, courses in general science, in aims, material and method, do not differ essentially from the courses in botany, zoology, and the rest, and the chief reason for this result appears to be that the *subject* concept of values still prevails.

The fact must be recognized that college entrance requirements are in terms of subjects and this must be taken into account. Two things, however, should be said about this. The first is that in the case of many colleges at least twelve subject units, determined by the college, must be presented and the three additional units may be such units as the *high school accepts for graduation.* Since the high school requires sixteen units for graduation, four functional units in any college preparatory curriculum would be possible without handicap to the student in entering college. In this particular, then, the school is free to organize a maximum of four of these units if it so desires. The second thing which should be emphasized in this relation is that there is now far too wide a separation between requirements for college entrance and preparation for college life and work. If one compares the units which students offer for entrance to college with their college programs, the distinction indicated above becomes very clear. It might be well, therefore, to stress the functional point of view in this relation rather than the subject point of view, so that students would be much better prepared for college life and work than they now are. It is not unthinkable, at least, that our college preparatory cur-

ricula need considerable overhauling at this point.

Taking into account college requirements and teacher preparation, it would not be desirable to undertake such reorganization of curricula as would result in the elimination of all subject or field units. On the other hand, it is proposed as an initial step to organize at least one unit to correspond to each of the four ultimate objectives and that these units be placed in the earlier years of curricula to be followed in the later years by the subject units. For example, when science has made contributions particularly to the health and vocational units, plenty of material remains in each of the sciences for units, each of which represents a single science subject. Likewise when the entire range of social studies have made their contributions to one or more of these functional units, subject units in this field are still available.

The college emphasis upon specialization in *subjects* has the dominated point of view and procedure in high school through both text books used and the teachers who use them. This prevailing point of view and practice is the greatest single obstacle to securing fundamental revision of high school curricula to correspond with present accepted educational outcomes; and it appears clear that we shall not secure functional emphasis in selecting subject matter and in teaching until the units (or at least some of them) constituting curricula are organized in such a way as to secure correspondence both in purpose and content with the objectives which we are seeking to realize.

Economy of Time in Subject Fields[1]

By G. W. Willett
La Grange, Illinois

What is meant by economy of time in education? In most literature of the last fifty years, the expression is considered synonomous with shortening the length of time which is required of students for completing the work prescribed for any or all of the several established units or "grades" of the conventional American school. Since the days of President Harper of Chicago and President Eliot of Harvard, many educators have been interested in accelerating students in their educational progress through the school, to the end that they (the students) may be prepared to enter upon their professional careers at an earlier age. President Eliot in particular was insistent that some means of shortening pre-professional work were essential. He called attention to the fact that the professional man was required to continue his education to an age which seriously interfered with his entrance upon the duties of establishing a home until late in his twenties or even later. His theory seemed to be that the place of economy was somewhere in the elementary or secondary program rather than in the professional school.

Practical educators in various parts of the country accepted the theory and undertook reorganization within public school systems with a view to permitting pupils to progress more rapidly. Various devices were evolved to promote rapid progress. Non-essentials were deleted from many courses. The report of the committee on economy of time offers numerous illustrations of possibilities in this direction. Such items as cube root, difficult problems in L. C. M. and G. C. D., and unusual tables of measurement were recommended for elimination from arithmetic. Many other subjects received similar treatment in recommendations from this and other committees, usually, though not always, in an endeavor to hasten progress. Such recommendations led to or were contemporary with movements to permit different groups to progress at different rates of speed, or in other words, with movements to permit certain better groups to short-cut the twelve year pre-college school by one or more years.

Contemporary with this interest in speeding up the process of preparation for the professional schools, arose an interest in the subject of retardation in the public schools. Studies revealed a great amount of retardation in the elementary and secondary school and an enormous early elimination of over-aged pupils. The problem of eliminating retardation became almost a fetish with some educators. Various devices which had been advocated for promoting rapid progress of normal pupils were adopted likewise to push along the retarded pupil as a means of retaining him in the school to a higher grade-level. In many cases, administrative subterfuge virtually eliminated retardation from local situations without in any way increasing the educational equipment of pupils. The mere fact that all fourteen year old pupils were enrolled in the eighth or ninth grade in no wise signified that the educational level of all those pupils was that of the eighth or ninth grade. A, B, and C groupings may be and prob-

[1] A paper read before the Commission on Unit Courses and Curricula, March 19, 1931.—The Editor.

ably are justified but the significance of the grouping arises from other reasons rather than from that of educational progress.

In many communities, the results from attempting to follow out the theory of rapid progress have been peculiar. Brighter or more out-spoken pupils have short-cut and repeated the process until the eighth grade has been completed by the age of ten, eleven, or twelve years. This has not been a serious matter in the elementary school where factors of adolescent social nature are not prominent. In fact, such individuals may progress through high school very nicely.

A great problem arises at the end of the high school career. What is a parent to do with a child who graduates from high school at fourteen, fifteen, or sixteen years of age? Further education usually means that the child must leave home and live in a new environment and associate with older and more sophisticated students. This is a serious matter. My experience with a school in which the number of accelerated pupils regularly equals or exceeds the combined groups of normal and retarded pupils has convinced me that this is about the most serious problem which the parent of an accelerated child has to face. Usually, the accelerated pupil is such from an intellectual standpoint but not from a social or emotional standpoint. The question facing the parent of the accelerate, unless he chances to live in a college community, is as to whether he shall yield to the call for intellectual advancement or heed the warning of immature social and emotional development.

Perhaps President Eliot may have been right in his contention that the professional student might well short-cut his early training if he be socially and emotionally stable, but 1931 finds more than 55% of the adolescents of the country in high school. Only a modicum of this great army is ever goi to take up professional work. Only small group of those who continue th education in institutions of higher lea ing will enter upon occupational ent prises which require more than fo years of college for entering the chos occupation. What opening is there f the college graduate of eighteen or nin teen years of age? Would you be i terested in employing a high scho teacher who had not reached the age twenty-one? How far wrong was t young physician who had completed h medical work at twenty-two when declared he was too young to start o and emphasized the statement by decla ing "Why you wouldn't want a twent two year old boy to cut you open if an thing was wrong with you?"

It should appear by this time that t writer believes that the matter of eco omy of time in education is a questio able matter if it signifies that the you pupil can become greatly accelerated. I other words, that he believes that eco omy of time in education possibly ar probably should mean a short-cutting o the usual years of school for the reta but that such a program would be u fortunate for the normal or accelerate pupil.

The great difficulty in administerin a plan which would assure rapid pro ress of the retarded and slow pupil whi avoiding acceleration of the already a celerated and bright pupil, is eviden Nevertheless such a program should b developed if one group or the other not to suffer.

A program for the administration o such a plan is not in the province of thi paper. Certain methods of attack, how ever, are in place.

First of all, let us assume that fro the standpoint of curriculum, no scho can justify requiring pupils to study o waste time on that material which the have already mastered. Morrison reco

zes this fact in his insistence on the ore-test" over work that is proposed for udy. There is no economy of time or fort in duplicating knowledge or ex-eriences which have already become a art of an individual. Who can justify ie requirement of some higher institu-ons that all pupils, irrespective of hether they have had chemistry in the igh school or not, must repeat general hemistry in the freshman year? What stification can be offered for a high chool requiring every pupil transferring it, irrespective of previous training, to epeat without credit a course in Eng-sh which parallels a course taken in he other school? Are schools supported or pupils or for administrators and su-ervisors? An elementary school must ndeed feel unusual pride when it makes practice of demoting one year every upil who transfers into the system.

Again, we wish to repeat that un-ecessary duplication is never justifiable. But most duplication does not arise rom problems of articularion as indi-ated in the preceding paragraph. Most luplication occurs because of incoördi-ation within a single school or from a ailure to analyze the local situation for oints of duplication.

For example, in the writer's school, or several years a course in practical echnical grammar has been given in the irst semester of the Junior year. A arge per cent of the pupils have elected his work, irrespective of previous train-ng or mastery of the mechanics of Eng-lish and English grammar. More than fifty per cent of the pupils had com-pleted two years of Latin and some con-siderable number had taken one year of another foreign language. These langu-age students almost without exception had usable concepts of technical gram-mar before entering the course. Why should they take the course? Hence-forth, only such pupils who, through thorough investigations, are shown to be deficient in grammatical knowledge will be permitted to take the course in tech-nical grammar. Other students are to be directed into special courses in con-structive English or literature where new materials will eliminate duplication.

Classes in advanced algebra will be tested out and segregated according to algebra ability. It is the opinion of one instructor in higher algebra that a por-tion of his groups can do all the new material offered in the second course in algebra within a period of four weeks instead of a semester. Such pupils will be speeded up not to get more credit but to go far afield from the work com-monly set aside for such classes. In this case again most of the gain will re-sult from eliminating duplication of mastered materials.

In many elementary schools, there has been introduced extensive work in sci-ence. In the seventh and eighth grades there is likely to be considerable time devoted to so-called general science. Text books for such work indicate a rather intensive survey of many topics of science. There are reasons to think that such work is entirely within the grasp of pupils of the seventh and eighth grades. Then why not offer the work at that level? We can see no legitimate reason for objecting to such work. If general science is studied extensively in the elementary school, it is only by a strong stretch of the imagination that one can justify repeating the course in the ninth. True, three book sets on general science are published with the implication that one is for each of the three years of the junior high school. But a general science course that will cover three years must either be dragged out mighty thin or must represent much duplication. When general science was first introduced into the ninth grade, there was a real reason for its study. The elementary schools were then offer-ing little if any science aside from a

little unorganized nature study. Under that condition ninth grade science had a real function to perform. Then, too, elimination of students during the early years of the high school meant that if many pupils were to get any information regarding natural phenomena, such information must be given early. At present there is a tendency for most pupils to remain in high school until the upper years of the institution. This fact has largely removed this objection to deferring high school science until later in the school life of pupils.

Then, why retain general science in those high schools which receive pupils from elementary schools which emphasize the work? Why spread the work out needlessly or duplicate the work of earlier years?

In many schools, a course in general geography might well displace the present course in general science. Contemporary with the introduction of extensive science work in the elementary school occurred neglect of geography, until today there is a woeful lack of knowledge of the location and significance of even the most important geographical places. Elementary schools may well be absolved of much responsibility for lack of geographic information. Acceleration of pupils and grade placement of geography have brought it about that pupils are usually only eleven or twelve years of age when they receive their last training in elementary geography. It seems entirely plausible that this is too early an age for the pupil to get an adequate comprehension of the facts and principles of geography. With present emphasis on travel, transportation, intercommunication and news distribution every individual has need of facility in interpreting geographic materials and need, likewise, of a large assimilative mass of geographic information.

Reorganization in Latin may well take the form of insistence on extensive translation of Latin into good English inste of wasting time on the counter proc of reducing good English to poor Lat This latter process represents an activ for which the only excuse today is th it may help understand Latin constru tions. Psychology has not proved th there is any advantage for establishi a process to have the converse of the pr cess practiced. In fact, the laws of hal indicate that any variation tends eith to interfere with setting up the desir activity or to increase the amount of tir and effort required to reach a desir standard of efficiency. It seems that e perimentation in Latin teaching whe extensive translation of Latin to the e clusion of Latin composition is at lea advisable. The average boy or girl mak better progress and has a keener intere in *solving* a puzzle which has been *i vented* by someone else rather than endeavoring to *invent* a *new* puzzle. am inclined to believe that adults as group likewise are short on inventio The elimination of Latin compositic should enable Latin students to increa greatly the amount of Latin read an thus give a wider experience with th language than is usually gained und usual procedures.

Why have pupils who have mastere the mechanics of English in the grad been required to waste a semester or year in repeating the same deadenin material in the ninth grade? Why shoul the rapid reader sit supinely by in a li erature class and wait for the readin drudge? Is this economy? In the pa we have talked about individual abilit and economy of time in the same breat but have failed to see any application o economy for the individual other tha rapid progress. We have prated of th idea that education should be a qualita tive matter rather than a quantitativ matter but have refused to consider tha all should not take the same work excep in so far as effected by election of sub

ects. If once we get the vision of avoiding duplication for him who has mastered material, we will be a long way on our way to recognizing the qualitative actors in education.

A second place for economy in subject fields is beginning to attract attention. Several years ago Fred Ayer submitted a thesis on the Psychology of Drawing at the University of Chicago. In this thesis he presented evidence to show that the drawing of pictures of the apparatus used in laboratory experimentation meant little to the pupil unless the pupil attempted to make the drawing call attention to some specific point or points in the figure. This should have been a significant discovery for teaching as exemplified in the physical and biological sciences. However, almost no teachers of science with whom the writer has talked has ever even heard of the study. Why do science pupils still continue to make general drawings with little or no thought to the figure evolved? Simply because they make drawings as an essential task to meet course requirements rather than to illustrate definite points or laws in science.

But this is only a small matter. Economy of time in science, perhaps, may be secured to a much greater extent if much if not all of the present individual experimentation (?) (I use the term advisedly) could give place to demonstration by the instructor who knows what he is doing and explains while things are happening.

As Dr. Downing tells us:

"These college graduates go out to teach science in the high schools and teach the only science they know, that which has been taught them, and in the way it has been taught them. This is largely by the laboratory method, when abundant research has shown the greater efficiency, for secondary school level, of the demonstration method." One of the recommendations to our association is "that colleges cease demanding of entrants from the high schools that science offered for admission shall have been done by the laboratory method, and accept science that has been taught by demonstration." In line with this recommendation now comes some of the developments in visual education. At the meeting of the Department of Secondary Education in Detroit last month, a demonstration of the use of the lantern and slide as a means of laboratory work was given. We could not but think how much time was saved over what would be required for each student to muddle around hoping to find something that would satisfy the instructor, thus dividing his attention between the mechanics of the microscope and the search after the unknown. As it was, the demonstrator was explaining all the time and interest was undivided. How many of our high school youth will ever use a microscope for technical purposes after leaving the class? How many of our youth will measure the theoretical efficiency of the lever? On the other hand, how many will fail to see the flowers along the pathway or will fail to utilize the principles of the lever? It would appear that there are great possibilities for economy of time in science and, accordingly, opportunities for learning more principles of science and for making applications of science, if schools will condescend not to consider high school pupils embryo research experts.

These examples should illustrate a new definition of economy of time in education. This theory, as has been explained, is—that for many, if not most, pupils the matter of rapid progress is questionable because of immaturity of pupils at the time of leaving the secondary school. This definition, we believe, is rapidly becoming the only tenable definition for economy of time because of the fact that in most schools retardation *for most pupils* has ceased to exist. This

being the case some radical reorganization of the whole school system in order to avoid forcing immature individuals to leave home is essential, or some administrative device for having rapid progress through the school apply only to the retarded must be evolved. If rapid progress through the schools is to be eliminated, then provision must be made for the elimination of duplication in subject matter. At all times, educators must be alert for opportunities to delete nonessential materials and devices and to introduce economical methods of procedure.

It would not be giving the whole picture if the development of the junior college in connection with the high school were omitted. This new institution is rapidly becoming a part of the public school system in a number of states. One of its chief functions seems to be that of caring for immature but intellectually equipped graduates of the high school. This institution offers two additional years of local schooling and consequently cares for the youngster at home until he is two years older. To a degree this eliminates one of the objections to rapid progress through the twelve years of the public school. It does not, however, eliminate the fact of youthful graduation from the university. Young graduates still have an unappreciative world to face with only their youth and diploma to recommend them.

The Junior College offers opportunity to avoid duplication between the upper years of the high school and the early college period. For example, experiments in joint classes in the senior year in high school and the freshman year in junior college have been undertaken with success in Joliet. Pasadena has undertaken the experiment of uniting the junior and senior years of the conventional high school with the two usual years of the junior college into a junior college with rather free election of work in the four year period. In our opinion, howev the fact that the junior college and senior high school are maintained unc the same control will soon bring it abo that there is real economy in time, cause duplication is bound to decrea when the same administrator dire both institutions.

So far in this discussion, the presen of duplication of materials has been e timated from investigation of materia offered and no consideration has be given to the possibility that duplicati may be essential for mastery. A che investigation on duplication in the loc school was attempted by issuing the a companying questionnaire to seniors an junior college students. Due to a seve blizzard not nearly all seniors or juni college pupils were reached on the da when the questionnaire was issued. Hov ever, the groups answering were typic groups. As is usually the case, no que tions were answered by all pupils. Pape were secured from 187 seniors, 43 co lege freshmen, and 40 college soph mores. The questionnaire was give March 9, which indicates that senio had completed two-thirds of their senic work prior to answering. The junic college students were so recently re moved from high school experience that they could recall rather definitel their high school experiences. On th other hand their college experience might give evidences of other duplica tion. All those answering had taken o were taking at least one year of Alge bra, one year of American history, an three years of English. Certain of th outstanding data are exhibited herewith (After separate tabulation of the dat for the two college groups it was eviden that there were no significant differences Hence the reports of the eighty-thre college students are aggregated to gether).

Needless duplication in English wa reported by 40.6% of the seniors an

39.8% of the junior college students. Evidently the students were of the opinion that reorganization of the English course was advisable. When two out of every five students have repeated English work which they have previously mastered, there is certainly plenty of opportunity for economy of time in English. Further evidence on this will appear in the answers to questions 2 and 3. No other subject was so severely arraigned so far as duplication was concerned as was English. Civics and General Science had been studied but a sem-

TO SENIORS AND COLLEGE STUDENTS:

1. Have you felt that there was needless repetition of work from one year to another in any of the following subjects? That is, could you have gone faster if given a chance? Check the subjects in which you found needless duplication.

English	German	Zoology	Manual Training
Mathematics	History	Chemistry	Music
Latin	Civics	Physics	Shorthand
French	General Science	Cooking	Bookkeeping
Spanish	Botany	Sewing	Art

2. What suggestion do you have to offer as to work that might well have been omitted in any subject which you have studied?.....

3. If you took English III the first semester and had taken Latin, did you find that much of that English had already been mastered before taking the English course?.....

4. Did you take at least two years of Latin?..... If so, do you think you would have liked Latin better if there had been no attempt to translate English back into Latin but instead, more time had been used in translating Latin into English?..... Give any comment you many have.....

5. How do you feel about learning to speak French, German or Spanish in class? Would you prefer to learn to translate rather than to learn to talk the language?.....

6. What parts, if any, would you eliminate from our present American History course?.....

7. What would you add to any of the courses you have had?.....

8. Where do you think we could save time in any of our high school subjects?.....

9. What subjects that you have had would you omit if taking your high school over again?.....

Why?.....

10. What work that you have not taken do you wish now that you had taken?.....

Why?.....

ester each and that too during the first year in high school. In all probability these subjects had been all but forgotten by most students. Duplication in History traced back to the fact that some pupils had taken Modern History before taking American History and consequently had studied some of the materials from a world standpoint prior to studying same materials in American History.

Mathematics materials had been duplicated for some of the more able students in the unnecessary review of elementary Algebra in Higher and College Algebra. It appears, however, that these 270 mature pupils recalled comparatively little of duplication in any particular field except that of English.

187 High School Seniors		83 Junior College Students	
Question I	*Duplication*	*Question I*	*Duplication*
English	76	English	33
Civics	15	Civics	7
History	13	History	11
General Science	10	General Science	3
Art	9	Art	2
Music	8	Music	3
Mathematics	7	Mathematics	6
Bookkeeping	7	Bookkeeping	1
Manual Training	7	Manual Training	0
Latin	6	Latin	4
French	5	French	1

Question 2 asked for suggestions as to what might have been omitted in any subject. This query called for constructive suggestions. Contrary to expectations, pupils were quite ready to offer suggestions of a singularly usable and sane type. Forty-five seniors offered really constructive criticisms of the English courses. Many of these will receive serious consideration in contemplated reorganization. Grammar was the particular part of English which was attacked because of repetition. One excellent student well expressed the views of many when he declared, "Each year of English is the same thing over. It seems that the school believes itself inferior in that line." Another declare "In English IV I am doing work that have been over four times before high school, i. e., the "mechanics of wri ing." And yet another, "Senten structure in English has been monot nous and unnecessarily repeated." A most no pupils indicated a desire have work lightened in any way. Wh they wanted was new materials to attac because "all English could easily be co ered in three years."

Duplication in other subjects dre a few interesting comments. One cha unburdened himself as follows: "I hav studied the Industrial Revolution fiv times now, Modern History, American History, Economics, Sociology, etc." A few general complaints were voiced such as "We go over each subject so many times." Many advocated the development of all subjects in Morrisonian units in order to care for varying abilities of pupils.

College students offered fewer suggestions than did seniors and what were offered were very similar to those reported from seniors.

In the first part of this discussion was brought out the fact that the local school must have had duplication for many students who elected Latin and English III. The third question sought student reaction on this point. It must be borne in mind in interpreting the responses to this query that a very considerable por-

on of those answering the questionnaire ould not answer this question because hey had not had both courses. Since nly a few pupils signed their papers, here was no way to check as to the sta- us of those who failed to answer this uestion. Sixty-seven high school sen- ors declared that there was needless du- lication in English III of work already nastered in Latin. Three were uncer- ain and sixteen others felt that they eeded the duplication. Thirty-six of he college students felt that they had wasted time in such duplication, while seven had felt a need for repetition. Evi- dently, in the opinion of students, the school is justified in its program of re- organization in this particular direction.

In Latin teaching is there an oppor- tunity for economy by eliminating Latin composition as inherited from the medi- eval schools? Eighty-two high school seniors believed so, while twenty-nine were doubtful or were thoroughly con- vinced that Latin composition was essen- tial. Forty college students were favor- able to the elimination of Latin compo- sition, while twenty favored its retention.

Is time spent in modern language classes in learning to speak the language worth while? Do modern language stu- dents prefer to translate and thus cover the literature more rapidly or are they willing to use the time in perfecting the lingual features? The fifth question called for this information. One hun- dred forty-one seniors favored emphasis on learning to speak the language, while fourteen favored translation. The col- lege students voted sixty-five to eight in favor of learning to speak the language rather than to translate.

American History as taught by the unit method was placed on a pedestal by the students of both high school and col- lege. A few students did favor eliminat- ing an emphasis on Columbus, because, as one boy said, "We've all heard all about Columbus anyway."

Questions 7, 8, 9 and 10 revealed noth- ing worthy of reporting here. A few very good minor suggestions applicable to local courses were offered. We have only one comment on questions 9 and 10. The answers to these two were of such a nature as actually to cancel each other when taken in the aggregate. No subject escaped from the elimination list or failed to appear on the preferred list. There was a far larger total for subjects which pupils wished they had taken than for subjects which they would not take again. This was due to the fact that many who would not leave out any subject which they had taken wished that they might have had an opportunity to take additional subjects.

Finally, is there any real value for curriculum revision in securing the opin- ions of mature pupils? We believe there is, especially when the responses which they give can be used as added evidence on mooted questions. Who can tell better than the individual who has been subjected to the process whether or not there are potential shortcuts to the process?

In closing, may we reiterate that econ- omy in time and effort in education, like economy in finance, need not signify a shortening of any transaction, but rather larger returns for the expenditure of the same amount of time and effort.

What Should Be the Policy Governing the Future Activities of the Commission on Unit Courses and Curricula?[1]

H. H. Ryan
Principal, Wisconsin High School
Madison, Wisconsin

The question which constitutes the subject of this paper has been raised by the Chairman of this Commission. There is in the question itself the suggestion of possible change in policy. Let it be said in passing that the raising of such a question, by the Chairman of the organization, is a symptom of a healthy condition of affairs within the Commission, and is also a tribute to the intellectual vigor and aggressiveness of the Chairman.

Before proceeding to an attempt to answer the question, it will be in order for the Commission to fortify itself spiritually by means of a survey of its recent achievements. A study of the last few volumes of the North Central Quarterly reveals the extraordinary prominence of material emanating from this Commission. Certain of this material has had a wide sale, running into the thousands of copies. Some of the sub-committees have carried out the critical analysis of subject matter, and the relating of objectives to the choice of subject matter, to points not reached by any other curriculum maker so far as this speaker knows. These analyses and their resulting schemes of organized material have been tried out in secondary schools in such a way as to show their validity as educative experiences.

It cannot be denied that these achievements would be more satisfying to the members of the Commission if we could be assured that the advance in curriculum conception exemplified in these experiments, and in the several pronouncements of the Commission, is reflected in palpable changes in the procedures of an adequate number of the secondary schools of the Association. Evidence upon this point is thus far lacking. For support in this earnest hope we shall have to rely upon the fact of the wide circulation of our printed material and upon the acceptance, for publication, of certain organizations of subject matter which have grown out of the Commission's work.

Taken all in all, however, the Commission can afford to stop and give itself a pat on the back, before facing the problems of the future. It has encountered discouragement in many forms. Its membership is composed of busy people. The continuity of its work as a Commission is broken up by the absorption of its members in the acute problems of their immediate responsibilities. And yet the undertakings of the Commission in recent years have been of such a nature as to call for continuous and sustained effort. There have been no small units which could be worked out in one meeting, recorded, and forgotten. Each committee meeting is a link between the completed portion of the task and that which remains undone. The task of the several chairmen, in coördinating the efforts of the members, has been a trying one, and has been done with the greatest of credit.

In turning to the consideration of the future work of the Commission, the speaker is convinced that the present high level of purpose and thought and

[1] A paper read before the Commission on Unit Courses and Curricula at the time of the annual meeting in Chicago, March, 1931.—The Editor.

ction of the Commission represents a ublimation of its function as originally onceived. The constitutional definition f the duty of the Commission is quite eneral. No very specific delineation of ts function is to be found in the proeedings of the Association, if the search f this writer has been thorough. But one reads between the lines the concern f the pioneers in this work over the standardization of the year's work in each of the high school subjects. There seems to have been the feeling that, in the midst of the confusion occasioned by the rapid changes in secondary school work, one crying need was for the establishment of a standard, valid, and carefully defined unit of study, fifteen or sixteen of which would compose satisfactory secondary school training, on the one hand, and adequate preparation for college on the other.

If such a purpose was the original actuating principle of the Commission, no vestige of it remains in the minds of the present personnel. The organization seems to have graduated out of such a conception into one which is much more forward looking. This improvement in perspective is due in part to the vigorous and intelligent leadership which the Commission has enjoyed, and in part to the trend of events which has influenced the thinking of these leaders. Two phases of the development of secondary education have tended to throw into relief the futilty of attempting to standardize the Carnegie unit.

In the first place, we have seen a tremendous increase in the effective range of the scholastic ability of the high school personnel. Where thirty years ago there was in the typical high school a negligible percentage of pupils below average mental ability, we now have almost as many of these as of those above average. This change has made impossible any standardization of a year's work in Mediaeval History, for instance. A definite body of work suitable to the abilities of the middle group is beyond the resources of the slower and fails to challenge the intelligence of the brighter. There has been some debate as to the right of the slow and middle groups to clutter up the halls of learning with their awkward feet. Gradually, after the vain struggle to set up minima for this and that, we have come around to a new philosophy which may be stated something like this: It matters little how many pupils reach somebody's arbitrary minimum; the important thing is that each pupil shall approach, as closely as possible, his own maximum. It is the function of the school to effect as much genuine improvement in each pupil as possible. It is no longer defensible to allow one type or quality of mind to dictate the curriculum. The slow mind must be offered a basis for development, and the gifted mind must be afforded the opportunity to extend itself to the limit. The range of mental ability in the typical high school today stultifies any attempt to set up a standard ration of learning.

The second consideration which is helping to clarify the situation is the discovery that, when it comes to predicting success in college, a list of the pupil's high school experience is a less reliable instrument than a brief survey of his abilities conducted shortly before his proposed entrance to college.

Justice demands that to the college be conceded the right to conceive its own function and purpose. True, the institution of higher learning must be sensitive to the wishes to the public, just as must any publicly supported institution. But it may be assumed that the college can, better than any other agency, vision its own peculiar part in the scheme of education. With this right goes the privilege of setting up its own curriculum and procedure. Furthermore, the college has the right to be selective in its

policy of admission. It has the right to set up criteria for judging the capacity of the applicant to profit by what it offers. So far, however, the college has not been conspicuously successful in estimating this capacity. For many decades the college has been allowed to define to the minutest detail the preparation for college entrance. It has listed the particular subjects which must be pursued in high school; it has usurped the inspectorial function of the state government; it has gone into the high school, popped the whip over the administration, compelled internal changes to suit its own purposes, and bestowed or withheld membership in the charmed circle of accredited schools. And then, after thus prescribing the training of aspirants to college membership, and selecting and receiving these aspirants to the bosom of Alma Mater, has turned around at the end of the first semester and sent a third of them home as unfit.

That the college has been industrious and conscientious in its efforts to select its students goes without saying. Its lack of success is to be attributed to the fact that until recently it has been working upon the wrong principle. It has been assuming that certain segments of accumulative material will produce college aptitude. As soon as this assumption has been generally abandoned the way will be open for a real solution of the problem. The Universities of Minnesota and Wisconsin have found examinations which are at least as reliable for predictive purposes as the four-year high school scholarship record. The State Teachers College at Greeley, Colorado, has begun to disregard the character of entrance credits and is taking into consideration only the quality of the preparatory work. Here and there we see an awakening to the importance of student-power, as opposed to academic history, as an index of college aptitude. The upshot of it all is this: This Commission should definitely abandon t idea of setting up quantitative standar for high school courses. To attempt do so is to fly in the face of what v know about the range of individual di ferences.

Let us assume that since this is an a sociation of both colleges and seconda schools, the most acute common pro lem is that of preparing some pupils f future college careers. This problem essentially one of selecting and organi ing experiences to offer these pupil The majority of pupils well suited t college work can be recognized whe they are ninth-graders. It should b possible to determine experimentally th kind and amount of training which wi best groom these pupils for college wor It should be possible to give this trainin with economy of time and effort.

For instance, what are the possibili ities of general or unified courses in th senior high school? Would an advance course in general mathematics brin about a better type of development fo general-educational and college-prepara tory purposes than does the present ar rangement of separate and self-sufficien courses in plane geometry, solid geom etry, trigonometry, and advanced alge bra? On the one hand we have thos like Milliken of California who are less interested in high school pupils than they are in science, or mathematics, o what not, and who feel that to set up a course of life problems depending fo solution upon first one science and then another is criminal violation of the fair person of Mother Science herself. On the other hand we have the college instructor in chemistry who prefers that his students shall have had no high school instruction in chemistry. On the one hand we have the historian who feels that to teach history with a view to making it contribute to the solution of current social problems is to be guilty of academic prostitution; on the other

nd we have those who are convinced at when we teach high school history we do, we thoroughly insulate each ourse against contact with other courses history or with life itself.

Should English composition be taught a separate subject, or should it be aught entirely in connection with the roblems of expression which arise in he study of the content subjects of the urriculum? Should science, mathemat-cs, and shop be taught as one subject? Should the final months of each high chool course in mathematics consist en-irely of problems, calling upon not only he branch of mathematics assigned to he year but all prerequisite mathematics as well?

Upon what principles should differ-ntiation in content, method, and ap-proach be based, so as to give full scope to the talents of gifted pupils? Here is one question which has not yet been answered in the science of education. We have plenty of administrative plans by which the school may be organized to permit differentiation on the basis of ability; but we know very little indeed about how to differentiate. Study the next magazine article which offers a three-level assignment, for slow, medi-um, and bright pupils, respectively. See whether you can find any principle what-ever in the differentiation. Nine-tenths of such plans merely give the bright pu-pils more motions to go through, more busy work. The slow pupils work prob-lems 1-10, the medium do problems 1-15, and the bright do problems 1-20, in careless disregard of the fact that the brighter pupils have less need than any-one else of problems 2, 4, 7, 8, 9, and 11. If differentiated instruction ever be-comes intelligent, it will be through care-ful attention to the psychology of learn-ing and through understanding of the effective differences between bright and dull pupils.

This Association is in a position to find answers to some of these questions by experimental methods. The individ-ual superintendent or principal is seri-ously handicapped in undertaking such experiments alone. As soon as he breaks away from tradition in a manner radical enough to serve the purposes of such an investigation, some agency or other dislodges his high school from the accredited list. Most school administra-tors are not ready to commit profes-sional suicide in the interest of science. But if the higher institutions of this As-sociation will agree to stand by such an investigation, there is no reason why it should not be undertaken.

For example, during the next eighteen months committees of this Commission might outline the first year's work of an experimental three-year college-prepara-tory program designed to take the place of the usual tenth, eleventh, and twelfth grade work. Let a number of the North Central high schools, any number from fifteen to forty, be authorized to organize one experimental group each, of about thirty pupils who will be ready for the tenth grade in the fall of 1932. Let membership in such an experimental group be conditioned upon the full con-sent and approval of the parents, upon the pupil's interest in the experiment, upon an ability rating which forecasts a successful college career, and upon what appears to be permanent residence in the community. Let the several Boards of Education pledge themselves that the pupil shall be duly graduated without prejudice or restriction, and let the col-leges of the Association pledge them-selves to admit these pupils in 1935 without condition. Let all other action be taken to clear away the possible rou-tine handicaps.

The course of study offered these ex-perimental groups should be what in the judgment of both secondary and collegi-ate members of the Commission will best serve the purpose. In designing such a

course, three types of objectives would have to be kept in mind: first, the value of the material for the immediate growth of the pupil; second, the value of the material for college preparatory purposes; third, the value of the material for general life purposes. The way to such a course has been admirably paved by two activities of the Commission: the organized list of aims and objectives, which has been the guiding principle of the Commission's work for many years; and the work of the Committees and sub-committees on Qualitative Standards, in relating specific subject matter to specific objectives.

It is possible, for instance, that about two-thirds of the school day would be devoted by these groups to the study of courses designed especially for them. The remainder of the day might conceivably be left free for studies selected from the regular high school curriculum. The former, the special courses, would undoubtedly cut across the present subject-division-lines. One hour a day, for example, might be devoted to health, with contributions from the subjects now known as physiology, biology, chemistry, home economics, and physical education. Another hour might be given over to community life, with contributions from civics, history, economics, sociology, and geography. Another hour might be devoted to problems in Natural Law, with contributions from science, mathematics, industrial arts, and home economics. Literature, music, and fine arts might well be experienced in regular high school classes; similarly, foreign languages, if deemed necessary, could be studied in the regular classes.

These special courses would have to be organized into units of workable size. There would be frequent examinations, to determine whether the objectives were being attained. The current criticisms of the principals and teachers in charge of these groups would bring about changes in procedure from month t month. The subsequent college achieve ments of these pupils would be evalu ated; the peculiar virtues and shortcom ings would be noted. At the end of th fourth year some evidence as to th success of the experiment would b available, and each succeeding yea would throw further light upon th question.

To recapitulate: The enterprise would be frankly an experiment in preparing pupils, of obviously collegiate caliber, t do a good job of their college work. N time would be spent on the problem o getting them into college; they would b assured at the outset of admission t college. The entire resources of the ex periment would be devoted to the ob jectives of immediate growth, prepara tion for college, and preparation for the problems of later life. Schools, pupils, and teachers would be selected in such a way as to exploit the possibilities of the plan in a most thoroughgoing fashion. The results would be checked at intervals, as long as the individuals could be followed.

While the plan would involve hard work, and discouragements by the score, it would afford a glorious opportunity to the intelligent curriculum maker, the intellectually curious principal, and the progressive teacher. A tremendous amount of time and energy and money has been put into curriculum study in the last decade by all sorts of organizations. The net results of this investment are not yet to be found in actual curriculum changes; they are rather to be seen in the orientation of thinking about the curriculum. This Commission has made its distinctive contribution to this orientation. A genuine fruition will have to await a coöperative enterprise something like the one described here, one to which all educational institutions concerned pledge their faithful support.

The Present Status of Curriculum Construction for the Elementary School in the United States[1]

Herbert B. Bruner
Teachers College, Columbia University

America has witnessed in the last decade more activity in curriculum and course of study construction than in all its previous history. Beginning in a few forward-looking communities as far back as 1920 the movement to examine and overhaul curricula and courses of study in the public schools has developed into national proportions. Thousands of communities are busily engaged in the task of curriculum construction or revision either as a whole or in certain subjects, buildings, rooms, or grades. The type of activity has varied from a remote realization that something ought to be done to extensive programs where entire cities and states have set up intricate and smoothly working organizations for revising their curricula and appropriated large sums to defray the costs. In many instances curriculum departments have been added to the research bureaus of city systems and well-equipped curriculum libraries and laboratories are being established all over the country. Appointment bureaus of our colleges are receiving more calls for graduates adequately trained in the techniques of course of study and curriculum construction than can be filled.

The public schools have not been the sole participators in this movement, as is evidenced by the emphasis being placed on curriculum and course of study problems in many private schools and teachers colleges. A study of the catalogs issued in 1900 by representative teachers colleges indicates that a large proportion of the courses listed dealt with experimental psychology and principles and methods of teaching. An examination of the 1910 catalogs of these same institutions reveals the beginning of courses in tests and measurements. During the last eleven years a wide variety of courses in curriculum and course of study construction has appeared. Some institutions are not only offering courses but establishing bureaus or laboratories which are directing all or most of their attention to the problems of curriculum construction and research.

The layman is also trying his hand. An increasing number of carefully-thought-out articles by non-school people is appearing in the newspapers and magazines on the problems of what and how to teach and the way the schools are meeting them. When we consider the fact that over 2200 prescriptions have been laid down by state legislatures regarding what and what not to teach in the elementary schools alone,[2] we must admit that our law-making bodies are engaging in curriculum construction to an extent that is almost menacing. In practically every community certain over-zealous organizations have in moments of enthusiasm urged the inclusion of pet subjects and topics in the programs of our schools regardless of the fitness of the subject matter or its relative importance when compared with other materials.

[1] A paper read at the Conference on Curriculum Organization and Revision at Northwestern University, Evanston, Illinois, October 30, 1931, and published here at the request of North Central Association officials. The address will also appear in the complete *Proceedings* of that meeting, the same to be published by the School of Education, Northwestern University, and from which copies may be procured on request.—The Editor.

[2] See J. K. Flanders "Legislative Control of the Elementary Curriculum," Bureau of Publications, Teachers College, Columbia University.

The difficulties have been augmented by the lethargy of the country in shaking off the curricular traditions which have been handed down from the days of the Latin grammar school. For, as new material and topics have been included either because of the demands of the layman and contemporary civilization, little of the old has been changed or removed, regardless of its lack of appropriateness. As a result the program of studies is becoming so cluttered with inappropriate and unrelated matter that it is virtually impossible for even the most conscientious of teachers to fulfill the assignments laid down by the public and her superior officers. It is little wonder, then, that those in charge of education in America are at last turning their attention in a serious and extensive way to the problems of curriculum construction and revision.

To discover some of the reasons for this unprecedented activity one needs but to consider the numerous and sweeping changes in our economic and social life in the last quarter of a century and to compare the qualities and abilities required of the individual to meet these new conditions with the training he actually receives in the schools using the present courses of study. With rapidly improving transportation facilities compelling an acquaintanceship with national and international problems heretofore considered academically only, with the telegraph, the telephone, the radio, and now television broadcasting the world's news to even the remotest places, with labor-saving machines and devices working a complete revolution in the modes of living of millions of people, with an economic order which permits of periods of extravagant prosperity and times of severe distress, a new curriculum is demanded. With one out of approximately every six marriages ending in divorce; with little more than one-half of the eligible voters exercising their right of franchise in the regular electio and a still smaller per cent in the p maries; with numerous stories rife graft and fraud in some of the highe governmental circles, local, state and n tional, we see new and onerous pro lems in the training of our childre problems which present curricula fail do their part in solving but for whi properly constructed curricula could ar should contribute at least partial sol tions.

The wide-spread activity of the la five years would indicate unquestionabl that the need for some change is begi ning to be recognized. While no cu riculum millennium is at hand, it woul appear that the schools are determine to shake off their traditional letharg and are envisaging the possibilities o curriculum construction and revision a one most promising method of attainin the proper goals of education.

Literally thousands of teachers, supe visors and administrators all over th country, many of whom are people o splendid training working in next-to-the child situations, are seeking materiall and methods for improving the variou curricula and constructing and revising courses of study that will come mor nearly meeting the real needs of th child of today. They are attempting programs directed toward the twentiet century demands for better adapted, more effective and more functional kind and degrees of education.

One of the measures of their activity is the number of courses now being produced. A recent investigation revealed the fact that prior to 1920 fewer than 1,500 courses had been published in the United States and over eighty per cent of these consisted of from one to twenty pages of references to text books. Since 1925 more than 30,000 courses have been collected in one laboratory alone. The movement has assumed national proportions and certain features of i

l fair to continue for many decades come.

While many of these courses of study e still poor in organization and con-nt, literally hundreds of them are be-nning to contain a scope and depth of aterials and methods little dreamed of courses ten years ago. They are sur-assing in many points the best of our xt books and supplementary materials. n fact some of the outstanding courses eem to be harbingers of what our text ooks ought to and will, in all probabil-y, contain.

What a contrast this outstanding type f course of study, and the teaching and arning accompanying it, makes with ie old type of course and much of the resent teaching and learning! The old pe course contains little more than are references to existing text books. ts chief aim is to dictate just what pages n the text book should be covered dur-ng any given period of time. The meth-ds of teaching and learning compelled y such a course are formal and non-exible. In the classroom the teacher ersus the pupil attitude is assumed; the uestion and answer method is adopted; he "stand-up" and "sit-down" proced-re predominates. A very limited amount f materials, many of which are often f little use to the child or adult now r later, is employed. In the elementary chool the day is divided into small peri-ds of ten, fifteen, and twenty minutes luring which teachers attempt to have he child learn small bits of unrelated nformation or certain seldom-to-be-used skills. Children, under the old scheme, are given little opportunity to form judg-ments or to follow through with their own interests.

Unfortunately over seventy per cent of the courses of study appearing in America today are still of this type. We are making progress, however, for in 1925 over ninety per cent would be classified with the type described above. In 1925 fewer than one per cent of 9,875 courses evaluated in the various fields of the elementary school were ranked in the top step of a five-point scale by competent, trained judges. In 1931 four and nine-tenths per cent were ranked in the top step by equally qualified and similarly trained judges. A closer analysis of the judged outstanding courses of study in 1931 leads to the following observations:[3]

(1) The almost universal tendency of the makers of the outstanding courses in the content fields, which have come to our laboratory in the last two or three years, to include a wealth of new materials and activities grouped into larger units built around central themes or big ideas. This is the most noticeable feature of these courses. This tendency has forced the members of course of study committees to delve into materials that have never before been introduced into the classroom. There is a distinct tendency to collect and utilize materials and suggest activities which will lead pupils, on the proper age and grade level, to a sounder realization of the pivotal issues which our country is now facing, and will assist them, at least in a far greater measure than in the past, in meeting the situations that arise now and probably will arise later.

(2) The tendency to abandon the practice of listing large numbers of specific objectives at the beginning of a course. Instead there are appearing at the beginning of the courses general statements of aim in the form of the themes, concepts, "big ideas," or generalizations. The specific objectives are being placed more frequently at the beginning of each grade or in close juxtaposition to the suggested experiences and content which would be utilized in attaining the specific objectives.

[3] It is evident that the observations listed below are not altogether mutually exclusive.

(3) A tendency to organize the course content on a combined topical and unit-of-work basis with a very definite emphasis in the highest rating courses in the latter direction. There is undoubtedly a growing tendency to apply the philosophy of education which attempts to take account of both the child's needs and those of adult life and which requires that problems whose solutions are of permanent value be attacked.

(4) An increasing use of the procedure which combines content and method rather than that which (a) delineates the content in one place and method in another and (b) depends upon the teacher to make the proper combinations.

(5) While in the main concrete helps in organizing the work in terms of pupil difficulty is, in most courses, still too meager, a very greatly increased number of suggestions for individual and group teaching and learning are appearing. Many courses urge that through the use of tests, pupils to be classified according to ability for different types of work in connection with the same unit. Too often, however, the courses have done little more than to make suggestions for administrative divisions in the groups. Some of the courses contain, however, such an array of excellent suggestions for organizing the members of a class in relation to varied and interesting experiences that their contributions are most valuable.

(6) Type and illustrative lessons, standards for judging instruction, discussion of the proper use of physical material, such as, maps, pictures, and the like, and carefully selected bibliographies for teachers and pupils are to be found in an increasing number of courses.

(7) An increasing tendency to direct the attention of pupils to moving forces, causes, and problems rather than to formal bits of knowledge.

(8) A better articulation of materi and experiences from the first grade the twelfth, especially in the cont fields, such as, science, and the soc studies. This is clearly evident in development, on the different age a grade levels, of the kind of materials a suggested experiences which will grac ally lead to appropriate understandings large and valuable concepts such as, "T Interdependence of Men and Nation "Man's Control of and Adjustment Nature," "Space is Vast," "The Fa of the Earth Changes as Time Go On," and the like.

(9) The increasing desire or willin ness of course of study makers to cro subject matter lines in their attempts secure informations and suggested e periences which will be pertinent to t problem under consideration or valua in leading to a better understanding the concept being treated. One indic tion of this is evident from the follo ing figures: Out of 21 separate cours of study in geography[4] rated as ou standing in 1925 only *four* were labell and accepted as social studies cours while in 1931 *seventeen* of the *thirty-o* separate recent courses in geograp rated as outstanding were labelled a accepted as social studies. Similarly, the *nine* separate courses of study history rated as outstanding in 1925 on *three* were labelled and accepted as s cial studies, while in 1931 *twenty-five* the *thirty-three* separate courses in hi tory rated as outstanding were labelle and accepted as social studies. Whi the conclusions drawn here do not te the complete story, it is entirely accura to say that when experienced and traine evaluators apply geography and histo criteria to the newer courses of stu far more outstanding geography and hi

[4] By separate is meant courses not contain in a general course for the community whi would include geography, arithmetic, spelli and in fact all fields.

y material is found in their judgment courses labelled and accepted as social dies courses than was discovered in 5. It is an excellent thing for edu- ion that *on the one hand* students be- ing in the efficacy of straight subject tter are including in a rapidly increas- degree materials from other fields l taking over for their own the prob- n-unit attack and, on the other hand, t students believing in the integrated gram are paying far stricter attention the accuracy and soundness of the ject matter they utilize.

(10) An increasing number of valu- e suggestions for the installation and of the courses of study. There are ne indications that course of study iters are at last beginning to abandon notion that even a good course of dy can be taken over by large num- s of teachers without suggestions as procedures for so doing.

A general overview of the whole cur- ulum construction situation in the ited States leads to the following ob- vations:

In Regard to Courses of Study:

(1) An increasingly greater number courses of study are being completed ch year. This is indicated by the fact eady stated that fewer than 1,500 urses of study had been produced in merica prior to 1920, whereas 30,000 ve been collected in our own labora- ry since 1920. In 1931 more courses ere produced than in any other year.

(2) The quality of the courses, par- ularly in the content fields, is far gher if we can accept the ratings of dges who are about as well qualified can be secured.[5]

(3) Of the 23,660 courses of study which have been evaluated in the Curriculum Construction Laboratory, Teachers College, Columbia University, during the past five years 17,642 or seventy-four per cent were written for elementary schools; 3,076 or thirteen per cent for the junior high schools; and 2,942 or twelve per cent for the senior high schools. The senior high school courses of study, with a few notable exceptions, are merely outlines of material which usually is treated more completely in some of the better texts.

(4) An increasing tendency to cast the materials of certain fields into new organizations. This is indicated by the fact that the Curriculum Construction Laboratory at Columbia University received, in answer to a regular, annual form letter, one hundred twenty-four courses in civics[6] prior to 1926 and have received one hundred four since; one hundred sixty-three courses in geography prior to 1926 and one hundred twenty-seven since—a decrease of 22%; one hundred twenty-one courses in history prior to that time and one hundred seven since—a decrease of 12%; and only twelve courses in social studies prior to 1926 but one hundred one since—an increase of 742%. While these figures are only for separately bound courses in the elementary schools they are rather significant when we consider the fact that a large percent of the judged outstanding courses are usually bound separately.

(5) A growing demand on the part of a large number of communities for judged outstanding courses of study produced in other communities. The State Department of Education of South Dakota, which published a social studies course for the primary grades in September, 1931, has already received hun-

[5] The evaluators employed the techniques and iteria listed in *Rating Elementary School urses of Study*, Stratemeyer and Bruner, Bu- au of Publications, Teachers College.

[6] The figures here are based on the number of separate courses received, i. e., courses bound separately, one subject in the bulletin.

dreds of requests for this course from practically every state in the Union and from a number of foreign countries. This experience can be duplicated by Houston, Denver, Los Angeles, and many other centers producing worthwhile curriculum materials. Since few, if any, would deny that a tremendous improvement could be made in the work of the nation's schools if all the curriculum materials and teaching could be raised to the level of the judged best, this step, which makes an attempt in that direction, is a good omen.

B. IN REGARD TO CURRICULUM CONSTRUCTION PROGRAMS:

Literally thousands of communities are attempting course of study construction and revision in some form and the activity is undoubtedly increasing rather than lessening. In many instances, especially in the larger centers, a separate curriculum construction department has been established, while in others the work of curriculum construction has been made coördinate with research and supervision and is included under such headings as the Department of Curriculum and Research or the Department of Supervision and Curriculum. In many communities the activities are carefully planned through extensive well-thought-out programs.

These programs are usually inaugurated by a year of lectures, discussions, and reading for the purpose of orienting the various groups in relation to the issues of education, the principles of curriculum construction and local problems.

Below is a very brief description of such a program for, first, a state; second, a city; and third, a county.

1. *A State Program.*

The State Department of Education of South Dakota, under the sponsorship of E. C. Giffen, State Superintendent of Public Instruction, and under the direction of Mrs. Hazel Ott, Curriculum Director and Elementary Supervisor, in augurated in 1929 a state program of curriculum construction and revision. Some of the features of this program are as follows:

With the assistance of the State Teachers Association the central theme of the 1929 and 1930 meetings of the State Association was made "Curriculum Construction." Speakers were selected for these meetings who could assist in the contemplated program. Not only was a general curriculum specialist from out of the state invited but also a number of outstanding subject matter specialists.

After the first state meeting, two central committees were appointed, one for elementary and one for secondary schools. The personnel of these committees was drawn from the teachers colleges, the colleges of education of the State College and the State University and the leading superintendents, principals, and teachers. These committees spent a year in studying the various approaches to curriculum making and reported their conclusions in a bulletin entitled "Preliminary Reports on Approaches to and Theories Regarding Curriculum Construction, and General Aims and Guiding Principles of Education for the State of South Dakota."

A few months after the appointment of the two executive committees, committees were appointed in practically every field of subject matter from the kindergarten to grade twelve inclusive. The members of these committees were furnished with abstracts of practically all the worthwhile materials on what and how to teach in their respective fields. They also received from the State Department of Education through the cooperation of local boards of education copies of judged outstanding courses of study and units in their own fields.

From time to time meetings of different committees were held to discuss procedures. The Curriculum Director and

e out-of-state Curriculum Consultant
ten met with these committees. Actual
ntributions in writing have been re-
ived to date from over 500 committee
embers. The first drafts of some of
e courses of study were off the press
September of this year and others are
follow.

Through a series of county institutes
e State Department of Education is
oviding a series of meetings available
every teacher in the state in which the
ew courses of study and methods for
eir installation are discussed. In addi-
on the teachers colleges have inaugu-
ated courses which have for their pur-
ose the training of prospective teach-
rs in the use of the new state courses
f study. These courses in the colleges
re in the main conducted by competent
structors who have served on the com-
ittees producing the state courses.

While the depression is compelling
ertain changes in the original program,
lans are going forward for the con-
nuance of its chief features.

2. *A City Program.*

In Houston, Texas, a curriculum re-
ision program has been under way for
ix years under the direction of Super-
ntendent E. E. Oberholtzer. After a
ear of discussions, conferences, and
eading engaged in rather extensively by
ost of the members of the teaching
roup, committees were appointed in
ractically all fields. The work was
oncentrated, for the first two years, in
he junior high school grades and ex-
ended during the last four years to the
lementary schools. During this time
ver 300 curriculum bulletins have been
roduced. It is a curious fact that al-
hough all divisions of the public school
ad equal opportunity for inaugurating
nd carrying through curriculum pro-
rams only ten of the 300 bulletins re-
ferred to above were produced for the
senior high schools.

The program in Houston has eventuated in one of the most far reaching and valuable curriculum experiments ever set up in public schools. In 1929 Superintendent Oberholtzer established a number of curriculum schools where promising materials and methods could be attempted before they were used by the city at large. Some of these schools were as follows:

A Language Arts and Related Activities School. Theme: A study of communication and effective expression by means of the spoken and written word.

A Natural Science School. Theme: A study of how best to live in harmony with nature's laws and appreciate and enjoy fully the good life.

A Social Science School: Theme: Living together, a study of social relationship.

A Mathematics School. Theme and emphasis: A study of the practical application, enrichment in use, and economy in learning of real arithmetic values in contemporary life.

A Fine Arts School. Theme: A study of the fine arts or the relationship of beauty to eternal truth.

A Child Laboratory School. Theme: A study of the integrating factors in education most useful to the full development of child life.

A Language Adjustment School. Theme: A study of the problems involved in the education of foreign-language-speaking students.

These schools were paired with a number of check schools where a more or less regular program of study was pursued. During 1928-29 a large amount of very excellent curriculum material was prepared especially for the integrated type of program in the elementary school. This material was produced by a few Houston course of study writers especially selected for this task. In 1930 the list of curriculum schools was extended and a scheme devised for trying

out the relative effectiveness of the integrated type of program as over against the straight subject matter type. Three practically equal groups of schools were selected for the work. In the A type of school the integrated type of program is being carried out. In these schools no requirements are made at the end of the semester as to the amount and quality of reading, writing, and arithmetic. Rather elaborate machinery consisting of interviews with parents, observations of pupils under varying conditions, discussions with pupils, and the like, has been set up. Objective tests will be used wherever possible for measuring not only reading, writing, and arithmetic, but other outcomes as well.

In the C type of school the ordinary subject matter program prevails and the usually allotted time of fifteen, twenty, or thirty minutes is devoted to each of the regular subjects, such as, reading, spelling, and arithmetic. The teachers in these schools are held responsible for pupil achievements in the various subject matter fields according to the usual regulations.

In the B type of school various combinations of the A and C types have been set up. Subject matter and curriculum specialists, laymen and general educators have been consulted extensively in developing this program. The results should be most revealing for the plans are well laid.

3. *A County Program.*

In Allegany County, Maryland, under the direction of Charles L. Kopp, County Superintendent of Schools, and Lillian C. Compton, Assistant Superintendent and Curriculum Director, a most interesting program of curriculum construction and revision somewhat similar to the Houston and South Dakota plan has been in progress for three years. The chief emphases in this program have been on units in social studies and science. Many of the units were prepared by teache of the county as instruction units an later developed by committees into cour of study units, although a number of t units were developed by specialists fro within and without the Allegany Count staff and sent to the teachers for revisio as the unit was taught.

In this county a very carefully planne experiment is being carried out as a do tor's dissertation by Mr. I. Keith Tyle for the purpose of measuring as nearl as possible the effect of unit teachin on spelling. Since all of the teaching i social studies in the elementary grade in Allegany County is now on the un basis, Mr. Tyler is using the elementar schools in a neighboring and simila county for his control groups. He i studying the effect of unit teaching (fo example, in a transportation unit) whe varying emphases are given to the spell ing of words appearing in the most fre quently used 3,000, such as, mile, trave train; and also the effect on words no usually included in the first 3,000, suc as dirigible, helium gas, and propellor There is need for similar studies in arith metic, penmanship, and many phases o the language arts.

Another most interesting outcome o the Allegany County program is th understanding and enthusiastic way in which some of the relatively inexperi enced and poorly trained teachers in some of the one room schools in the Appalachian Mountains in this county are utilizing the unit approach.

It has been demonstrated in these schools also that a carefully planned program of unit teaching will do much to solve the too-many-classes problem of the rural teacher, since the large number of classes can be reorganized into fewer larger and more natural groups. This is not possible, however, unless rather complete and carefully adapted course of study materials are placed in the teacher's hands in advance and a series of

etings held to acquaint her with these terials.

These are some of the things that are ppening in course of study construc- n and revision especially in the public hool field. That the colleges are be- ming to adapt their courses to meet e demands of the field in respect to rriculum construction is evidenced by e appearance of a large number of w courses in the theory and methods curriculum construction and in the emendous increase in enrollment in rriculum classes during the last five ars. In our own University, six stu- nts enrolled in the classes of the curri- lum division five years ago. Seven ndred sixty-two enrolled in the year 30-31.

Even the above brief and inadequate rvey of present conditions in curri- lum making would indicate without uestion that there is not only a tremend- us and growing enthusiasm for develop- g new curriculum materials but that an xcellent start has already been made.

Never in our educational history has here been a more appropriate time for making fundamental changes in our curriculum materials on a wide-spread scale. Both the public and the members of teaching groups in America are sensing the need for change as they have in no other period. The present economic stress and the repeated revelations of our inadequacies to cope with the problems involved have brought us to a realization of some of the fundamental weaknesses of our present curricula and our methods of teaching. If it were not for the possibility of drastic cuts in appropriations that some of these not understanding needs might demand, continuance of the present depression might actually be a blessing to education, for it would force still larger numbers of people not only to a realization that all is not well but to an active endeavor to make some much needed and overdue changes in our curricula. Our next task will be to capitalize in an optimum way upon the promising work that has already been done; for the opportunity which present conditions offer for revising the curricula of America is unique and constitutes a challenge which curriculum makers must accept.

Report on the Experimental Use of Units in Physics

A. W. Hurd
Institute of School Experimentation
Teachers College, Columbia University

It is apropos at this time to give a brief review of the work of the committee during the past year and again state its viewpoint concerning the purposes of the experiments being carried on. There is considerable evidence that the objectives of the committee are not thoroughly understood. Experimental efficiency will be enhanced if a clear understanding is secured. This report attempts to answer briefly and concisely the question, "What are we trying to do?"

First of all, we are trying to *select essential concepts* in physics to be taught in classes in physics, using the *ultimate* and *immediate aims* as stated by the Committee on Standards for Use in the Reorganization of Secondary School Curricula, as *criteria for such selection.*

Second, we are trying to formulate units of instruction which include these concepts as an integral portion of the unit. Choice of the unit title is essentially part of the selective process, for the concepts are subsidiary to the development of the unit and contribute to it.

Third, we are trying to formulate tests to determine the acquisition of these concepts.

Fourth, we are getting schools to use these units experimentally, measuring pupil preliminary proficiency, final achievement after instruction, and gains from instruction.

Fifth, we are trying to secure satisfactory achievement ratings by finding better methods of instruction.

Sixth, we are preparing and distributing reports on the experiments in order to make clear the experimental results and stimulate further and better experimentation.

For three years, teacher outlines, pupil work sheets, and pupil tests have been furnished free of cost to coöperating schools, and many of the reports from these experiments have been printed in the North Central Association Quarterly. For example, three of these reports appeared in the March, 1931 issue of the Quarterly.

The first is under the title, "The Experimental Use of Teaching Units in Physical Science," and gives a summary of the experiments carried on in 1929-1930. The achievement ratings are shown to be somewhat more satisfactory than those for 1928-1929 published in the September, 1929, issue of the Quarterly, but if the concepts chosen may be considered as fundamental and essential, achievement is still far from satisfactory. The mean final score per group per unit is 54.1. A teacher in one school criticized a unit for being too easy. He said, "Why, I can teach this to my ninth grade sections in general science."

We told him that that was exactly what the committee wanted, but that in three years of experimentation we had not been able to obtain satisfactory achievement scores even from 11th or 12th grade sections. *We are trying to get more satisfactory achievement on a smaller selected body of instructional material* in classes in physics.

The second study (p. 474) has the title, "Curriculum Development Based on Unit Experimentation." This is really

[1] This report was made at the Chicago meeting in March, 1931. Additions have been made to include experiments of 1930-31 which were not completed at the time of the meeting.

analysis of Unit VIII, "Electric ghting Systems," preparatory for the perimentation during the year 1930-31. anges in the unit are explained to ow elimination of concepts to secure herence and closer adherence to the imate and immediate aims of the mmittee. The plans for the experi- ents are given on pages 485-489. The tempt has been made to make them ore definite and concise than former periments. Experiment III leaves the ors wide open for the use of any or- nization or method which teachers ink wise. A specially prepared log eet has been devised for this experi- ent in order to get fairly accurate pic- res of procedures followed during ass periods. Experiments I and II tline methods which are expected to sult in improved achievement records.

The third study (p. 490) has the title, Teacher Opinion on Problems of Sci- nce Teaching," and is a summary of uestionnaire returns from experiments rried on in 1929-30. Some significant atements are indicated, such as, "The resent course in physics is too long"; Pupils have no time for project work"; More intensive concentration on a few nits is desirable"; and "Units should xplain common things in the environ- ent."

Eight other reports have been pre- ared and, with one exception, summar- es have been published or are soon to e published in different periodicals. One f these is an account of sixteen control xperiments carried on during 1929-30 nd has the title, "The Work-Book as an nstructional Aid."[2] Many data are given and discussed. Generally speak- ng, the work-book is shown to be useful o some teachers but not indispensable o all. There is opportunity for further experimentation to show more clearly how work sheets may best be used.

[2] *School Review*, 39: 608-616, Oct., 1931.

A second report has the title, "Effects of School Instruction on Pupil Achievement."[3] It gives graphic distributions of the scores of pupils in *preliminary tests, final tests,* and *gains,* for two units of instruction, illustrative of eleven which have been prepared, for two years of experimental trial. The question, "What type of distribution is desirable?" is raised and attention is directed to factors of pupil achievement, and present conditions making for poor achievement.

A third unpublished study is, "Realized Achievement in Relation to Expected Achievement." It is really an item analysis of eleven unit tests with two years' of data and sets forth upon a consideration of concepts thought essential to the development of the units. For example, it is shown that the concept, "Power is the rate of work," has 38% of correct response in the preliminary test, and 72% in the final. There thus remain 28% of the pupils who have not acquired this concept through the instruction given. Similarly, 27% do not know after instruction that a water meter measures quantity of water; 14% do not know that air pressure supports mercury in a barometer; 41% do not know that humidity is commonly expressed in per cent; 28% that steam is the most feasible method of heating large buildings; 30% that an electric motor is operated by electrical energy; and 24% that the pitch of a tone is determined by the rate of vibration. Including similar data heretofore given for Units I and VIII, more than 900 concepts are treated in this manner. The study again directs attention to the importance of careful selection of concepts to teach and test.

A fourth study has the title, "Preliminary Tests as Prognostic of Final Achievement."[4] Preliminary test scores

[3] *Science Education*, 15: 239-243, May, 1931.

[4] *School Science and Mathematics*, 31: 745-748, June, 1931.

are shown as the best single criterion of final achievement, but reasons are given in explanation of why they cannot always be considered dependable.

A fifth study is, "Does Remedial Instruction Pay?"[5] This is a summary of Experiment I[6] carried on during the school year of 1930-1931. Data are given for thirty-three classes in twenty-two schools which show conclusively that a week of added remedial instruction pays big dividends in increasing pupil achievement.

A sixth study, "The Textbook Versus Work Sheets in Instruction"[7] is a summary of Experiment II[8] of the series of 1930-1931. These experiments in fourteen high schools were improvements over those described in, "The Work Book as an Instructional Aid," but generally substantiate them in the findings.

A seventh study, "Teacher Opinion and Suggestion on Teaching Units in Physics"[9] gives a summary of answers to a questionnaire to teachers coöperating in the series of 1930-1931. Fourteen points are made, one of which recommends a minimal essential-project program. Another indicates the great importance attached to the committee ultimate aims which have been followed in all unit development. A third shows that the committee's immediate objectives are not thoroughly understood by teachers.

An eighth study is, "General Report on Class Achievements Unit VIII, Electric Lighting Systems, Experimental Series 1930-1931."[10] This gives achievement ratings in preliminary and final test for ninety-three classes in fifty-five schools. These experiments resulted in much higher mean scores per group than any former ones, viz., 65.4 per cent as against a next high of 54.2 per cent. The cause is assigned as more careful planning of unit objectives and methods of teaching.

The experimental series of 1931-1932 is now under way in seventy-two classes in thirty-nine schools. A printed unit with copious illustrative materials is the most noteworthy addition to the experimental materials.

From the experimentation carried on in the past, a few large apparent generalizations stand out which are worthy of serious consideration.

It should be emphasized that the general plan of unit formulation and experimentation has implications for all subject fields. While physics is used as the concrete field under consideration, and the conclusions apply particularly to physics, the importance to the total secondary school program should not be overlooked. As a matter of fact, no concentration on one course offering will satisfactorily solve the problems of curriculum reorganization. Only through consideration of the total curriculum will such solutions come. Attention to the implications of the following statements to the total curriculum is solicited.

The increase of knowledge in physics has been tremendous in the past twenty-five years. It is folly to attempt to cover the whole field in any one year of instruction. An evident necessity is the careful selection of important concepts with the consequent elimination of the less important for the year's course as now given. The ultimate and immediate aims of the committee may well serve as valuable criteria to aid in such selection.

A minimal essential and project program seems indicated by the experimentation so far conducted. The selection spoken of above, should be directed par-

---

[5] *School and Society*, 34: 467-468, October 3, 1931.

[6] For directions for these experiments, see N. C. A. QUARTERLY, 5: 485-489, March, 1931.

[7] *Educational Administration and Supervision*, December, 1931.

[8] See foot-note 2.

[9] *School Science and Mathematics*, January, 1932.

[10] Issued in mimeograph form and distributed to coöperating teachers.

ularly toward the minimal essential ogram which should serve as a basis pupil orientation for more complete ing. A reasonable plan would restrict work on minimal essentials to the ool periods. In other words, lesson signments on minimal essentials should t use up the time of pupils outside of classroom. This should be reserved r real living which the project pro-am is designed to be. Instead of re-icting the influence of the school upon e pupil, this provides for just the op-site eventuality. It gives the school uch more opportunity to influence in a rge way the whole life of the pupil. xtra class and out-of-school time ould receive definite attention and ans should be carefully made for it. his is what is meant by a project pro-ram. It is obvious that the projects ould be really life projects—not arti-ial preparations of "cut-and-dried" sson assignments. This involves tre-endous and far-reaching changes in the chool curriculum which for lack of time ay not be discussed here. There is uch more involved than appears on he surface.

If such a program is carried out, it eans that the minimal essential portion f the plan must be greatly abbreviated. here is abundant evidence that present eaching is too extensive and superficial. We cannot be complacent about the in-licated lack of mastery by so many pu-ils. There should be mastery but it hould be on very *carefully chosen con-epts*. It would seem that a reasonable tatement would be that *minimal essen-ials should be selected for the slowest normal pupil to be accomplished during class periods*.

Unit experimentation is the process most likely to result in satisfactory re-organization. It is really a progressive process of *selection* and *elimination*. At the present time it is safe to say that there there is a gap of from ten to thirty years between educational theory and practice. Unit experimentation on the part of more schools will serve to close up this gap. Research has discovered facts but they have not been incorporated into school practice. Experimentation attempts to do this very thing, but is wisely cautious by insisting on measured products of the new plans in order to prevent unwise adoption of new procedures.

Poor achievement is due to poor planning. We do not concentrate emphasis on essential concepts. We leave too much to chance and often forget that we have not even mentioned the concepts thought essential. Our present plan may be compared to the pouring of liquid in a bottle so rapidly that practically all of the liquid is spilled over on the ground. While it may not be wise to carry the water analogy too far in this case, it aptly illustrates present superficial instruction.

A sequential curriculum in elementary and secondary school science would help solve some of our problems, especially that of time. If a year is too short to teach the important concepts in physics, more time furnished by the sequential curriculum would make this possible.

European schools may serve as an illustration here. They do not attempt to teach the important concepts of physics in one year but spread them out over several years.

Coöperative experimentation must receive the support of administrators, supervisors, teachers, and the Association as a whole. Our present teacher training program will never care for it adequately. The program being carried on by the Institute of School Experimentation cannot be depended upon to care for it. A central unifying bureau should be provided and ample financial aid secured. Approximately $5,000.00 is being expended by the Institute of School Experimentation on the experiments in physics

this year because the Institute is interested in this particular program.

There are two steps which should be taken soon which are indicated by the experiments so far conducted:

First—Make provisions for closer contacts between those in charge of experimentation and teachers engaging in it. This is essential for better control and more carefully conducted experimentation.

Second—Set aside a few schools where this experimentation may receive more studied attention. This will make possible the closer contacts mentioned in number one.

Until these are made possible, the experimentation being conducted is well worthwhile. The projects so far carried on speak for themselves. They will naturally be improved upon due to the skill secured through continued practice.

Experimental Unit on Color for High Schools

William G. Whitford
The University of Chicago

UNIT THEME.—The Art Concept of Color

Knowledge and appreciation of color as a basis for class room and life needs.

The major aim of this unit is to establish thoroughly the concept of color as a prerequisite for all future art needs.

Objectives.—The ultimate objective of the unit is primarily Social. It deals with color, color facts and understanding, and the use of this knowledge in practical problems of the classroom. It is intended that the learning factors centered upon color in the unit will be of such a nature that they may be applied easily to the color problems encountered in everyday life situations, or the affairs which make up the social world. In this respect the unit may be said to emphasize the social objective.

The Leisure-time objective relates in a general way to the social and for that reason has not been separated in this study.

The material of this unit does not consider the Vocational objective, but it does lay a foundation of color knowledge and experience which is fundamental to later specialization in color work for vocational purposes.

The immediate objectives of the unit are those established by the Committee on Standards for the Re-organization of Secondary School Curricula. The statement of immediate objectives has been simplified for each sub-division of the unit as follows:

For the Knowledge Objective, Primarily

For the Appreciation Objective, Primarily

For Habits and Skills, Primarily

Introduction (for the Teacher).—It is not the purpose of this unit to present an exhaustive set of exercises or problems in the use of color in art work. Color exercises, as such, should not be segregated into one unit for development, but should form part of practically all art activities carried on in the school.

It is assumed that you already have been using color extensively in various kinds of art work and that you will continue to use color in later problems undertaken in advanced art courses of the school.

The primary purpose of this unit is to help the pupil to systematize his color knowledge and thus serve as a rich and practical body of factual material for all future work in color, both in school and in later life.

The color book project.—A major project or activity of the unit is the making of a color booklet or portfolio. This will include either the construction of a suitable booklet as a class problem or the securing of a notebook appropriate for the work of the unit.

Each unit element or division of the unit should be organized carefully into an outline of work covered and included in the notebook in neatly written, typed, or printed form.

Illustrations are to be collected from magazines, newspapers, and all available sources for use in the notebook. Careful attention should be given to clipping, classifying, and mounting the illustrations so as to produce a book of satisfactory art merit and attractiveness.

Suggestions are given under each division of the unit for the types of illustrative material appropriate for the notebook project.

Guide and work sheet material.—The learning factors or definite understandings to be acquired by the unit have been classified under five sub-topics or unit elements,

Unit Element I. What is Color?

Unit Element II. Color Characteristics.

Unit Element III. Color Grouping.

Unit Element IV. Color Harmony.

Unit Element V. Color in Everyday Life.

The guide or work sheet material listed under each division of the unit aims for a rather intensive concentration upon a few fundamental and practical aspects of color rather than an exhaustive treatise of the problems of color in art. Only a limited number of activities has been included under each unit element. To include more material of this nature would tend to extend the teaching program beyond the scope of a general art course. Teachers should feel free, however, to change this material in any way they may wish to meet their own particular needs.[1]

There is no one text-book available for the development of this unit, but the book "Enjoyment and Use of Color" by Sargent[2] makes the most fundamental contribution in this respect. The book has been outlined in part for purposes of reading in connection with the first four divisions of the unit. These readings will be of great value to both teacher and pupil as assimilative material in connection with the topics presented.

However, the teacher should bear in mind that many of the discussions and exercises of the book are too advanced for the junior high school level and should guide the pupil's reading assignments so as not to introduce material which will be confusing to him. Many references have been omitted for this reason. In others the difficult phases could not be separated from the general text to be covered.[3]

The book by Weinberg, "Color in Everyday Life"[4] has been outlined in part for reading in connection with the last division of the unit. This book, like Sargent's will prove difficult for junior high school students. However, the parts used for reference can be understood quite easily if interpreted carefully by the teacher.

For advanced students who assimilate color knowledge quickly, sections of Weinberg's book may be used for supplementary reading and optional problems as follows.

Unit Element I. What Is Color?—Weinberg, Chapter II, What Color Is and How It Acts, pp. 20-34.

Unit Element II. Color Sensations.—Weinberg, Chapter II, What Color Is and How It Acts, pp. 34-43; and Chapter IX, The Threefold Aspect of Color, pp. 184-203.

Unit Element III. Color Grouping.—Weinberg, Chapter III, Choosing a Color Combination, pp. 44-57.

This chapter is not recommended for student reading unless the teacher can explain effectively the difference in theory presented from that of Sargent and other authorities. Weinberg uses the law of "simultaneous contrast" for establishing his complementary color pairs instead of

---

[1] For teachers who might wish to develop this material as an independent course in color it is suggested that the different unit elements might properly be expanded as a series of units for a quite comprehensive study of color.

[2] Walter Sargent, *The Enjoyment and Use of Color.* New York: Charles Scribner's Sons, 1923, pp. xi-274.

[3] The writer enjoyed the privilege of giving the course on color at the University of Chicago under the direction of the late Professor Sargent and he has been in close touch with Mr. Sargent's methods and work since 1913. It is believed that the following unit incorporates the spirit of the Sargent technique in every detail and for that reason will have special interest for teachers who wish to base their color work on a carefully established color theory.

[4] Louis Weinberg, *Color in Everyday Life.* New York: Dodd, Mead & Company, 1918.

ne colors opposite each other in the color rcle. However, this difference is easily xplained and the student will be better repared to adjust differences in color heory appearing in print if he learns to hake discrimination in such matters early h his color study.

Unit Element IV. Color Harmony.—Weinberg, Chapter IV, The Art of Color Arrangement, pp. 58–69; and Chapter XIII, Color Harmony, pp. 239–61.

Unit Element V. Color in Everyday Life.—Weinberg, Chapter X, Nomenclature and Color Standards, pp. 204–12.

Innumerable suggestions will be found throughout Sargent's book for supplementary problems and optional research which may be utilized to extend the program of work for students who may have an unusual background of color knowledge or who may be more rapid workers than the average. Some of these problems are presented on the following pages: 34–35, 39, 68–69, 74, 78, 87–88, 90, 93–94, 118, 127–28, 130, 139, 150, 154, 156–57, 162, 166–69, 172–81, 194–95, 210–15, 219, 231, 246–68.

Also a quantity of suggestions for pretests and final tests are to be found in Sargent's book at the end of each chapter.

The work of each division has been listed as pupil activities seeking to impart definite knowledge, appreciations, habits, and skills in the understanding and use of color. The subject matter of the unit has been compiled in the form of a combined guide and work sheet technique centering the interest upon the objectives set up for the work to be covered as follows.

UNIT ELEMENT I. WHAT IS COLOR?

FOR THE KNOWLEDGE OBJECTIVE, PRIMARILY

For assimilative material for this topic read Sargent, Chapter I, *Color Sensations,* pp. 18-43, and other references as indicated.

1. Study the phenomena of light by use of the prism.

2. What do we mean by the term spectrum colors?

3. Demonstrate with a glass prism the breaking up of a ray of light into the colors of the spectrum.

4. Explain wave length of light and its relationship to color vision.

5. Explain the theories of transmitted light and of reflected light.

6. Explain how these theories produce two different fields of color manipulation in the arts.

7. Discuss and illustrate color light and pigment colors as observed in Nature and in Art.

8. Point out the difference in the color theory of the physicist and the color theory of the artist.

9. Form a statement of the significance of color knowledge and the use of pigment colors in relationship to everyday life activities.

10. Discuss color media and classify the various kinds of coloring matter used in the arts.

11. Name the spectrum hues and explain why these hues are called the standard colors.

12. What do we mean by the following terms: 1. Primary colors; 2. Secondary colors; 3. Intermediate colors?

Explain the derivation of each of the above designations of colors.

Sargent, pp. 7–9.

13. Demonstrate with a color chart "The Color Circle" and its use in the field of color manipulation.[5]

Sargent, pp. 9-11.

[5] The six standard or spectrum hues with their six intermediates which form the twelve color circle are called the "fundamental colors." They comprise its major color sensations at their full intensity or brilliance and are the basis for the development of all modified colors to be observed everywhere about us.

FOR THE APPRECIATION OBJECTIVE, PRIMARILY

For Appreciation Objective read Sargent, Chapter VII, *Color in Nature and Art,* pp. 233–46.

14. How does a knowledge of color phenomena aid us in the appreciation of color in the arts?

15. Observe and analyze color phenomena in Nature and in Art.

16. Write a theme on the "Beauty of Color in Nature and in Art."

(The preparation of this paper should be continued through each step of the unit and result in a completed project at the end of the unit).

17. Make a collection of reproductions of pictures and other illustrations of art in which the primary, secondary, and intermediate colors are used.

Carefully select and mount significant examples in your notebook.

FOR HABIT AND SKILL OBJECTIVES, PRIMARILY

ACTIVITIES FOR ALL PUPILS

18. Make a color circle showing

a. The primary colors

b. The secondary colors

c. The intermediate colors

Use prepared colored paper for this purpose.

See Sargent, pp. 9–11.

19. Draw several squares or rectangles on your paper. Practice the application of watercolor washes to these areas to produce color panels without streaks or "puddling of color."

20. Make clear, even washes in water color of the twelve fundamental colors or hues which composed the color circle. Use the colors at full strength or brilliancy.

21. When you can apply color in even, flat washes make a color circle using your own color trials for the purpose.

22. Organize the significant points under the topic, "What is Color?" so as to comprise a concise summary of th material studied.

23. Prepare a neat written, typed o printed page of this material for you notebook.

HABITS AND SKILLS TO BE ACQUIRED

24. Skill in recognizing the funda mental colors.

25. Skill in designating with accurac the fundamental colors as found in Na ture and in Art.

26. Skill in classifying the primary the secondary, and the intermediate col ors with respect to the color circle.

27. Skill in mixing and applying colo pigment to paper in clear, even washes

UNIT ELEMENT II. COLOR CHARACTERISTICS

FOR THE KNOWLEDGE OBJECTIVE, PRIMARILY

For assimilative material for this topic read Sargent, Chapter II, *Color Values and Intensities,* pp. 61–103, and other references as indicated.

1. Study the color characteristic or quality of *hue.*

Sargent, p. 6–7.

2. *Hue* is the quality by which we distingush one color from another. Explain the meaning of this statement by a concrete illustration.

3. Name the twelve fundamental colors and illustrate each by showing a correct color sample.

4. Study the color characteristic or quality of *value.*

Sargent, pp. 6–7, 11–12.

5. Value is the lightness or darkness of a color.

Explain the meaning of this statement by a concrete illustration.

6. Explain the term "neutral value scale" and explain the use of this scale in color work.

7. Define the terms *tint* and *shade* and explain the value relationship of each.

3. Study the color characteristic or ality of *intensity*.
Sargent, pp. 6–7, 12–14.
9. *Intensity* is the quality by which we tinguish a strong color from a weak e. Explain the meaning of this state- nt by a concrete illustration.
10. Show the relationship of black, ite and gray to the fundamental col- s of the color circle.
11. Discuss the artistic qualities and es of black, white and gray.
12. What do we mean by the term olor Families?" Explain how the ny different colors produced by modi- ation of hue, value, and intensity may classified into definite family groups.
13. Bring to class a variety of objects ch as leaves, flowers, moss, bits of col- ed cloth, beads, ribbons, pebbles, shells, Try to match these objects care- lly with the proper colors of your lor charts.
14. Explain which modification or odifications of color have resulted in oducing the color example you exhibit respect to several of the above objects. Answer questions similar to the fol- wing.
To which of the six spectrum colors this dried brown leaf related?
What changes in color have produced e present hue?
Similarly explain the color of a rose tal, a light green leaf, a larkspur ower, a petunia, pansy, etc.?
15. Name the *warm* colors and the ol colors.
Explain the distinction in color quality hich is made in this case.
Sargent, pp. 54–55.
16. Warm colors are said to be *ad- ancing* and cool colors *retreating* in ef- ect. Discuss this phenomenon and ex- lain how it may be utilized advantage- usly in art work.
Sargent, pp. 55–59.
17. Make a study of the symbolism nd psychology of color.
Sargent, pp. 44–53.
18. Explain the necessity of establish- ing definite relationship of color and color qualities in the arts.
19. Explain the necessity of establish- ing accurate color nomenclature as a basis by describing color qualities.

For the Appreciation Objective, Primarily

For Appreciaton Objective re-read Sargent, Chapter VII, *Color in Nature and in Art,* pp. 233–46; *Color in Nature,* pp. 78–94; *The Splendor of the Peacock,* p. 81.

20. How does a knowledge of *hue, value* and *intensity* aid us in the appre- ciation of color in the arts?
21. Observe and analyze color values and intensities in Nature and in Art.
22. Appreciation of the use of modi- fied colors for various purposes.
23. Make a collection of reproductions of pictures and other illustrations of art in which value and intensity of color are apparent. Carefully select and mount significant examples in your notebook.
24. Collect examples of symbolic uses of color for your notebook.

For Habit and Skill Objectives, Primarily

activities for all pupils

25. The color circle already produced illustrates the changes in hue which take place in the colors of the circle from red to violet. Demonstrate with paints how red changes to orange, yellow to green, blue to violet, etc. This is a change in *hue*.
26. Likewise demonstrate how a color changes in *value*. Make a value study of each of the six spectrum colors to show the effect produced by adding black.
Sargent, Experiment I, pp. 95–98.
27. Make a value scale for the three primary colors (red, yellow, and blue) to

show two tints and two shades for each color.

28. Demonstrate how a color changes in *intensity*. Make an intensity scale for each of the three primary colors (red, yellow, and blue), including five steps from full intensity to neutral gray, for each color.

Sargent, pp. 12–14.

29. Conduct an experiment in the artistic effect to be secured by the mingling of one color with neutrals (black, white and gray).

Sargent, pp. 86–89, Experiment II, pp. 98–100.

30. Organize the significant points under the topic, "Color Characteristics" so as to comprise a concise summary of the material studied.

31. Prepare a neatly written, typed or printed page of this material for your notebook.

HABITS AND SKILLS TO BE ACQUIRED

32. Accuracy of color vocabulary and use of technical terms in regard to color.

33. Skill in mixing and using color accurately.

34. Habit of describing color and color qualities accurately.

35. Skill in matching colors (accuracy of color vision).

36. Skill in recognizing the many different values of a color.

37. Skill in recognizing the many different intensities of a color.

38. Skill in classifying the many modified colors to be observed on every hand with the fundamental colors of the color circle.

UNIT ELEMENT III. COLOR GROUPING

FOR THE KNOWLEDGE OBJECTIVE, PRIMARILY

For assimilative material for this topic read sections of Sargent, Chapters III, *Complementary Colors;* IV, *Composite Colors;* and V, *Triads* as indicated.

1. Study the different colors and the effect upon each other when combin in groups.

2. *Monochromatic or "one color grou ing."* Explain the meaning of mon chromatic color arrangement and prese a concrete illustration.

Review Sargent, Chapter II, pp. 6 103.

3. *Complementary or contrast grou ing.* Explain the meaning of compl mentary color arrangement and prese a concrete illustration.

Sargent, Chapter III. Complementa Colors, pp. 104–07, 115–32.

4. *Adjacent or analogous groupin* Explain the meaning of adjacent col arrangement and present a concrete lustration.

Sargent, Chapter IV. Composite Co ors, pp. 140–64.

5. What is meant by "Composite co ors?" Discuss the importance of com posite colors in art work.

Sargent, pp. 133–38.

6. *The Triads.* Explain the meanin of the triads in color grouping and pr sent concrete illustrations.

Sargent, Chapter V, Triads, pp. 182 92.

FOR THE APPRECIATION OBJECTIVE, PRIMARILY

For Appreciation Objective read Sa gent, Chapter VII, *Color in Nature an Art,* pp. 244–70 and other references a indicated.

7. How does a knowledge of colo grouping aid in the appreciation of work of art?

8. Observe and analyze monochro matic color combinations in Nature an in Art.

Sargent, pp. 223–28.

9. Make a collection of good example of monochromatic color groups for you notebook.

10. Observe and analyze complement

color combinations in Nature and in

argent, pp. 104–15.

1. Make a collection of good exam- of complementary color groups for r notebook.

2. Observe and analyze "composite rs."

argent, pp. 133–38.

3. Observe and analyze adjacent r combinations in Nature and in Art. argent, pp. 140–64.

4. Make a collection of good exam- s of adjacent color groups for your ebook.

5. Observe and analyze triad color nbinations in Nature and in Art. Sargent, pp. 192–93.

6. Make a collection of good exam- s of the triad color groups for your ebook.

FOR HABIT AND SKILL OBJECTIVES, PRIMARILY

ACTIVITIES FOR ALL PUPILS

17. Make pointers or finders out of dboard which can be used on your or chart to indicate the varous groups adjacents, the complementary group- s and the triads of color.

18. Color a design panel with mono- romatic grouping of hues.

Sargent, p. 93, Problem A, pp. 100–03. Review Experiment II, Minglings of e color and neutral, pp. 98–99.

19. Conduct an experiment to produce auty of color area by mingling com- ementary colors.

Sargent, Experiment III, 3, 4, and 5, . 129–30.

20. Color a design panel with com- ementary grouping of hues.

Sargent, Problem B, p. 131.

21. Conduct an experiment to produce auty of color area by mingling adjacent lors.

Sargent, Experiment VI, p. 170.

22. Color a design panel with adjacent rouping of hues.

Sargent, Problem C, p. 171.

23. Conduct an experiment to produce beauty of color area by minglings of the triads.

Sargent, Experiment VIII, 1, 3, 4, 5, pp. 196–97.

24. Color a design panel with a triad group of hues.

Sargent, Problem E, p. 198.

25. From the results of the various experiments in minglings of color select the color sample you like best and prepare end papers for your notebook in "marble paper" effect.[6]

26. Organize the significant points under the topic, "Color Grouping" so as to comprise a concise summary of the material studied.

27. Prepare a neatly written, typed or printed page of this material for your notebook.

HABITS AND SKILLS TO BE ACQUIRED

28. Skill in recognizing and using the different color groups.

29. Skill in grouping colors in interesting effects in various forms of art expression: painting (a picture in water-color), design (panel designs, all over patterns and posters), designs for industrial art objects such as a piece of pottery, textile, batik, lampshade, stained glass window, etc.

An infinite number of problems or projects may be developed in this connection depending upon the factor of time and interest. Too much emphasis, however, on creative problems tends to change the unit technique from an appreciation type to a practical type where the emphasis should be largely creative.

UNIT ELEMENT IV. COLOR HARMONY

For assimilative material for this topic read Sargent, Chapter VI, Color Har-

[6] Many supplementary problems may be undertaken as suggested in item 29 for students who have satisfactorily completed the regular assignments of this division of the unit.

monies, pp. 199–228, and other references as indicated.

FOR THE KNOWLEDGE OBJECTIVE, PRIMARILY

1. What do we mean by color harmony? Present illustrations to explain harmonious use of color in various arts, i. e., in a painting, a dress, a piece of pottery, textile, rug, flower arrangement, etc.

2. In what way does the information acquired under the preceding topic, color grouping, aid us in securing color harmony?

3. Explain why the various color groups, although consisting of related hues, may not produce harmony unless carefully adjusted.

4. Explain how the adjustment of colors in a group may be effected so as to produce mutual relationship and result in harmony.

5. Memorize the following rules which are frequently used to produce harmony in color groups. Explain each and demonstrate with concrete examples after you have conducted the experiments listed under "Habits and Skills Objective," p. 421.

a. The addition of a little gray to the various colors of a color group tends to produce harmony.

Sargent, pp. 77, 156.

b. Different colors may be harmonized by introducing an element in common. The mixture of one color with all the other colors of a group tends to harmonize the entire group.

Sargent, pp. 208–10.

c. Any two colors may be made to harmonize by adding a little of one with the other.

Sargent, pp. 156, 212.

d. Two colors may be harmonized by adding two hues which are adjacent to each in the spectrum.

Sargent, pp. 157, 212.

e. Harmony of different colors may be secured by adjustment of the areas of the color pattern, i. e., a small amou of brilliant color balanced with a larg amount of grayed or softened col tends to produce harmony. In mo complex color groups a nicely propo tioned pattern of color areas produc harmony.

Sargent, pp. 218–19.

f. Bringing all colors of a group equal value and intensity tends to pr duce harmony.

Sargent, p. 220.

g. Color harmony may be produced b balancing brilliant and dull, light an dark colors. A color of light value intensity above middle will balance wit a color of equal distance in value an intensity below middle and tend to pr duce harmony.

Sargent, p. 221.

FOR THE APPRECIATION OBJECTIVE, PRIMARILY

For assimilative material for this top read Sargent, Chapter VI, Color Ha monies, pp. 199–228, and particularl the Color of St. Mark's Cathedral, 205, Color of the Opal, p. 206, Color i the Landscape, pp. 213–14, Reflection of Color in Nature, pp. 216–17, Work of Art, p. 223, Nature, pp. 224–28.

6. Observe and analyze fine color ha monies in Nature and in Art.

7. Conduct an experiment to analyz beauty of color combinations in Natur

Sargent, pp. 224–28 and Experimen X, p. 231.

8. Bring to class for demonstratio fine examples of color arrangement i flowers and plants and other example from Nature.

9. Make a collection of color example for your notebook showing fine color har mony in as many kinds of art as pos sible.

Sargent, pp. 223–24.

Classify the illustrations to show th different kinds of harmony studied i this unit.

or Habit and Skill Objectives, Primarily

activities for all pupils

0. Color a design panel so that har-
y of color is secured by the addition
little gray to each of the colors.
argent, pp. 77, 156.

1. Paint three bands with different
rs at full brilliancy upon your paper,
, yellow, blue, and red. Experiment
relating these diversified colors by
nting light washes of other colors
r them. Decide whch effect is most
monious.
argent, pp. 208–10, and Experiment
1, 2, 3, 4, p. 229.

2. Supplement the above experiment
looking at a brightly colored land-
pe in Nature through different colored
es of glass.

3. Using full strength yellow, blue,
red, experiment in harmonizing
se colors by mixing a single hue with
h color.

4. Color a design panel so that har-
ny of color is secured by introducing
olor in common, either by carrying
color over all the other colors, or by
king it with them before applying to
paper.

5. Color a design panel with two
ng colors and harmonize these colors
adding a little of each to the other.
Sargent, pp. 156, 212.

16. Experiment in harmonizing two
ors at full intensity by adding two
es which are adjacent to each in the
ctrum.
Sargent, pp. 157, 212, and Experiment
, 5, p. 230.

17. Conduct an experiment in which
or harmony is secured by the adjust-
nt of color area in a pattern. "Intense
nes and strongly contrasting colors are
ually more pleasing in designs of
hall area." Sargent, p. 219.
Experiment by using different colors
full strength in different areas with the other colors subdued or softened to give emphasis to the one color.

18. Color a design panel with various hues at equal value and intensity.
Sargent, p. 220, and Experiment IX, 6, p. 230.

19. Color a design panel so as to produce harmony with colors of light value balanced by color of a dark value.
Sargent, p. 221.

20. Place the results of your experiments in color harmony together. Pick out the ones which seem most pleasing in color relationship. Study the process of securing harmony in these examples and apply the knowledge gained to all future work in color.

21. Compare the design panels produced under Unit Element III, "Color Grouping," with those produced in the exercise above. In what ways can you apply the rules of color harmony to the preceding problems in color grouping?

22. Organize the significant points under the topic, "Color Harmony," so as to comprise a concise summary of the material studied.

23. Prepare a neatly written, typed or printed page of this material for your notebook.

habits and skills to be acquired

24. Skill in grouping color harmoniously.

25. Skill in modifying color groups so as to produce related or harmonized color schemes.

26. Skill in using color harmoniously in painting, design, handicrafts, and in all exercises and projects of the classroom.

UNIT ELEMENT V. COLOR IN EVERYDAY LIFE

For the Knowledge Objective, Primarily

For assimilative material for this topic read Weinberg, *Color in Everyday*

Life,[7] Chapters V, VI, VII, XVIII, and other references as indicated.

1. Study color in the houses of your community.

2. What color combinations do you like best? Why?

3. What is the relationship of color in the body of a house to the roof, the trim, the chimney, and other appurtenances?

4. How does color knowledge apply to gardens and general landscape design?

5. How can we apply the knowledge of color combinations to the problems of interior decoration?

Weinberg, Chapter VI, Color in the Home, pp. 103–42.

6. How can we apply the knowledge of warm and cool colors in interior decoration?

7. Discuss the selection and grouping of furniture, rugs, and general accessories from the standpoint of color.

8. What do we mean by "fitness" in the use of colors in an object of art?

Weinberg, Chapter III, Choosing a Color Combination, pp. 44–48 and Chapter XVI, The Laws of Fitness in Harmony, pp. 291–99.

9. What is the relationship of the color of a picture to that of the general color scheme in a room?

10. Study color in pictures appropriate for use in the home.

11. Make a list of fine pictures for the home and classify them according to general color treatment.

(The small color prints published by The Art Extension Press, Westport, Connecticut, or the Brown Robertson Company, 424 Madison Avenue, New York City, may be used for this purpose).

12. How can we use color successfully in clothing or dress design?

Weinberg, Chapter V, Color in Dress, pp. 70–102.

13. Discuss the problems of col which apply in a general way to t clothing of (*a*) the girl, (*b*) the boy.

14. In what way does a study of col aid us in selecting appropriate colors a color combinations for our own partic lar needs in costume and accessories?

15. What are some of the problems color which confront the business ma and how may these problems be solv by a knowledge of color theory?

Weinberg, Chapter VII, Color in Bus ness, pp. 143–73.

16. Discuss the subject of color a its relationship to city planning and ge eral problems of the community.

17. How is color employed in illumina tion?

Weinberg, Chapter XVIII, Color I lumination, pp. 310–22.

18. Make a study of color in the the tre from the appreciation standpoint.

Weinberg, Chapter XIX, Color in t Theatre, pp. 323–33. D'Amico, *Theatr Art,* Chapter V, Color: An Artistic an Dramatic Force, pp. 62–67, and Chapte VII, Light and Color: The Heart o the Stage Picture, pp. 87–103.[8]

19. Write a theme upon one of th following topics depending upon you interest:

Color in Everyday Life
Color and Its Relationship to Hom Art.
Color in Dress
Color Problems of the Business Ma
Color in the Industrial Arts.

FOR THE APPRECIATION OBJECTIVE, PRIMARILY

For appreciation objective read Wein berg, Introduction, pp. xi–xvi and Chap ter I, Color in Everyday Life, pp. 3–19 and other references as indicated.

20. Observe color schemes used i

[7] Weinberg, Louis. *Color in Everyday Life.* New York: Moffat, Yard & Company, 1918.

[8] Victor E. D'Amico. *Theatre Art.* Peoria Illinois: The Manual Arts Press, 1931.

ting houses in your community. sify the color combinations you like best.

1. Collect for use in the notebook trations from magazines and other ces showing effective use of color on se exteriors.

2. Observe color schemes used in the rior of fine homes of your com- ity.

eview Weinberg, Chapter VI, Color he Home, pp. 103–42.

3. Collect illustrations from maga- s and other sources showing effective of color in interior decoration.

4. Observe the color of pictures used home decoration. Analyze the pic- s carefully for their appropriateness color with other colored objects to be d in a room.

Veinberg, pp. 122–24.

5. Select four color prints (minia- es) which you would like to have as tures for your home. Mount these your notebook with explanation of ir color qualities.

6. Observe color in dresses for vari- occasions. Study costumes in stores l art museums.

Review Weinberg, Chapter V, Color Dress, pp. 70–102.

27. Collect examples from magazines l other sources showing fine use of or as applied to problems of the cos- ne.

28. Collect examples of color as ap- ed to the problems of the business n.

Review Weinberg, Chapter VII, Color Business, pp. 143–73.

29. Observe and analyze color quali- s in objects of the industrial arts.

See Sargent, pp. 86, 223 for color ality in textiles, pp. 137–38 for color porcelain, pp. 89, 222, and Experiment (6b), pp. 230–31, Color in Printing, d Weinberg, pp. 163–69.

For Habit and Skill Objectives, Primarily

activities for all pupils

30. Make a simple line drawing of your house or any other house you may choose. Color your sketch to show an appropriate color scheme for repainting the house.

31. Make an elevation plan for the interior walls of a house. Work out a satisfactory color scheme for floors, walls and ceiling.

32. Using the same design, add chairs, rugs, furniture, pictures, pottery, curtains, and other accessories to produce a harmonious interior color scheme.

33. Make a list of suitable color schemes for the following rooms: living room, dining room, bedroom with a north light, bedroom with a south light, bathroom, kitchen.

34. Make simple line drawings of costumes for (*a*) a girl, or (*b*) a boy. Color your sketches so as to produce harmonious color schemes suited to your own particular complexion and coloring.

35. Make a design for a textile, a piece of pottery, a stained-glass window, or other object from the field of the industrial arts. Demonstrate in this way that you can apply the knowledge of color presented in this unit.

36. Make a poster to illustrate the theme chosen in problem 19. Use black and two primary colors harmonized according to instructions given in Unit Element IV, Color Harmony.

37. Plan a flower arrangement for the dining table or an office desk in which attention is given to color harmony of the different flowers and the bowl or vase used as a container.

38. Organize the significant points under the topic "Color in Everyday Life" so as to comprise a concise summary of the material studied.

39. Prepare a neatly written, typed or printed page of this material for your notebook.

HABITS AND SKILLS TO BE ACQUIRED

40. Skill in applying color knowledge intelligently to all problems presented in real life, in dress, home furnishings, house painting, yards and gardens, advertising displays, in business, industry, and in all phases of art in relation to life needs.

REFERENCES

Books

SARGENT, WALTER. *The Enjoyment and Use of Color.* New York: Charles Scribner's Sons, 1923.

LUCKIESH, M. *Color and Its Application.* New York: D. Van Nostrand Company, 1915.

PHILLIPPS, L. M. *Form and Colour.* New York: Charles Scribner's Sons, 1925.

WELLING, JANE B. *More Color for You.* Chicago: Abbott Educational Company, 1927. (For the elementary school but will be helpful in the high school).

WEINBURG, LOUIS. *Color in Everyday Life.* New York: Dodd, Mead and Company, 1918.

GOLDSTEIN, HARRIETT and VETTA. *Art in Everyday Life.* New York: The Macmillan Company, 1925.
Chapter VIII—How to Know Color, p. 184.
Chapter IX—How to Use Color, p. 204.
Chapter XVI—Color in Dress, p. 285.

TRILLING, MABEL B. and WILLIAMS, FLORENCE. *Art in Home and Clothing.* Unit I—Color in Everyday Life, pp. 2–25.

MISKELLA, WM. J. *Practical Color Simplified.* Chicago: Finishing Research Laboratories, Inc., 1928.

JACOBS, MICHEL. *The Art of Colour.* Garden City, N. Y.: Doubleday, Page & Co., 1923.

LEMOS, PEDRO J. *Applied Art.* Mountain View, Calif.: Pacific Press Association, 1920, pp. 272-82.

MUNSELL, A. H. *A Color Notation.* Baltimore, Md.: Munsell Color Company, 1926.

VANDERPOEL, EMILY N. *Color Problems.* New York: Longmans, Green Co., 1908.

RUSSELL, MABLE and WILSON, ELSIE. Art *Training through Home Problems.* Peoria, Illinois: The Manual Arts Press. (In press.)

Periodicals and Magazine Articles

BIRREN, FABER. Bringing the Study of Color up to Date," *The School Arts Magazine,* XXX (April, 1931), pp. 483–87.

BIRREN, FABER. "The Basic Principles of Co Harmony," *The School Arts Magazi* XXX (April, 1931), pp. 505–09.

BIRREN, FABER, "What the Physicist Offers Color Study," *The School Arts Magazi* XXX (May, 1931), pp. 552–55.

BIRREN, FABER. "What the Psychologist Offe to Color Study," *The School Arts Mag zine,* XXX (June, 1931), pp. 624–26.

BAILEY, HENRY T. "Symbolism of Color," T *School Arts Magazine,* XIX (June, 192 pp. 567–71.

LEMOS, JOHN T. "Color Charts for the Scho Room," *The School Arts Magazine,* XI (June, 1920), pp. 580–84.

CHEESEMAN, JAMES. "Color as Business Sy bols," *The School Arts Magazine,* XI (June, 1920), pp. 585–86.

COPP, GERTRUDE. *Color in Costume,"* T *School Arts Magazine,* XIX (June, 1920 pp. 609–611.

Materials for the Unit

Three sided glass prism

Color Sample Books
University Colors—Milton Bradley Compan Springfield, Mass.
Chroma Colors — Abbott Educational Com pany, 1603 South Michigan Avenue, Chicag Illinois

Color Charts — Abbott Educational Compan 1603 South Michigan Avenue, Chicago, Il

Water colors from any of the following firms
American Crayon Company, Sandusky, Ohi
Binney-Smith & Company, 41 East 42n Street, New York City
Abbott Educational Company, 1603 Sout Michigan Avenue, Chicago, Illinois
Devoe & Reynolds Company, 565 Smit Street, Brooklyn, N. Y.
Milton Bradley Company, Springfield, Mass achusetts.
The Thomas Charles Company, 2249 Calume Avenue, Chicago, Illinois
Practical Drawing Company, 1315 Sout Michigan Avenue, Chicago, Illinois, and Dal las, Texas

Small Color Prints
The Art Extension Society, Westport, Con necticut
Brown, Robertson Company, 424 Madiso Avenue, New York City
The Colonial Art Company, 1336 West Firs Street, Oklahoma City, Oklahoma.

General Art Courses for High Schools[1]

WILLIAM G. WHITFORD
The University of Chicago

*Analysis of the junior high school pro-
ım in art.* Art education is still in a
riod of experimentation and evolution.
ere is no recognized precedent estab-
hed for procedure as is the case in
ner subjects taught in the high school.
ere is no general agreement in regard
the kind of courses that should be
ven or in respect to the phases of sub-
ct matter to be covered in any particu-
r course.

For this reason it was necessary for
e Sub-Committee on Art to make a
eliminary study of the problem of or-
nization before proceeding with the
ork on unit teaching.

At the last annual meeting of the Com-
ittee on Standards for the Re-organi-
tion of Secondary School Curricula
e Sub-Committee on Art was author-
ed to carry on an investigation to de-
rmine types of subject matter appro-
riate for units in a general art course
r the junior high school field.

In this connection the writer secured
e coöperation of Mrs. Catharine Boyd
alhoun, a graduate student in the
chool of Education, the University of
hicago. Mrs. Calhoun made a careful
nalysis of fifty published courses of
tudy in art from prominent cities of the
ountry to determine types of subject
natter in art being used in junior high
chools at the present time.[2]

From this investigation three hundred and thirty-one different items of subject matter were compiled. The data thus secured were classified under three headings as follows:

LIST I. TOPICS FOR PROJECTS AND SPECIAL ACTIVITIES.

LIST II. SPECIAL TOPICS RELATING TO ART HISTORY.

LIST III. CREATIVE AND MANIPULATIVE ACTIVITIES.

List I included one hundred and twenty projects and activities for study and experience-gaining purposes. The topics of this list provide primarily for "functional information" and knowledge and appreciation of art as related to daily life adaptations.

List II contained thirty-seven separate topics relating to history of art or knowledge of art of various periods.

List III was composed of one hundred and seventy-four creative and manipulative activities involving motor and constructive experiences.

These three hundred and thirty-one separate items of subject matter were printed in a compact check list, or "drag net questionnaire" and the list was then sent out to three hundred teachers and supervisors of art in junior high schools asking their coöperation in checking the items which should be included in a general art course for the junior high school level of instruction. A reprint of this questionnaire and the lists of topics follow.

The three lists of art subject matter found in fifty courses of study are included in this report because they offer an excellent digest of the kinds of art

[1] This is a Progress Report of a Committee harged with the duty of "determining types f subject matter for the General Art Course or High Schools, adapted to the unit tech-ique of instruction."—The Editor.

[2] Calhoun, Catharine Boyd. Unpublished naster's thesis, "Survey of the Opinions of Leaders in Art Education to Determine Appro-riate Material for a General Art Course for he Junior High School." Department of Art Education, The University of Chicago, Chi-ago, Illinois, 1931.

topics being taught in the schools at the present time. Many requests have been received from teachers in the field fo copies of this material.

QUESTIONNAIRE

Name .....

Present position .....

Address .....

Do you agree that instruction in principles and elements of art should b taught as bases for all types of art instruction? Yes [ ] No [ ]

Please check (√) topics which you feel should be included without question i a general art course for seventh and eighth grades.

Think of the course as used in all schools rather than an individual cours to be used in any one locality.

Be careful not to include things that should not be undertaken before th senior high school.

LIST I

TOPICS FOR PROJECTS AND SPECIAL ACTIVITIES
(For study and experience-gaining purposes)

Social Needs for Buildings
The Purpose of Ornament
Principles of Composition
Modern Figurines in Porcelain
The Use and Care of Drawing Instruments
The Work of Successful Illustrators
Psychology of Theater Art
Curtains and Hangings for Living-Rooms
Beauty in Civic Buildings
The Art of the Book
The Destruction of Books by Insects, Dust, etc.
The Purpose of Advertising
The Selling Power of Good Design
Marine Paintings
The Symbolism of Color
Structural Features of Well-Planned Rooms
Beauty Found in Nature
The Value of Neatness and Order
Elements of Design
The Evolution of Domestic Architecture
The Study of Sculpture
Design Suitable to Purpose
The Origin of the Alphabet
Beauty in Graceful Bridges
Formal and Informal Balance
Equestrian Statues
The Skyscraper
Out-of-Door Living-Rooms
Lighting and Shadows in Stage Design
Carrying Qualities of Colors in Posters
Parks and Boulevards
The Influence of Tools upon Design
Social Value of Advertisements
Climatic Requirements for Building Materials
Visit to an Artist's Studio
Dinner-Table Arrangements
History of the Book
Symbolic Figures in Sculpture
City Planning
History of Art
Local Industries and Factory Production
Flower Arrangements in the Home
Pictures as Wall Decorations
Vocational Possibilities of Art
Project in Theater Art
How To Mend Books
Use of Art Principles in Daily Life
Famous Painters
Modern Industrial Pottery
The Primitive House
The Care of Books
Visit to a Terra Cotta Plant
The Modern Movement in Art
The Study of Floor Coverings
Desirable Locations for Homes
Dishes and Utensils Used in the Home
Methods Employed in the Commercial Art Shop
The Activities of Family Life
Sculpture as Architectural Ornament
Methods of Commercial Reproduction in Graphic Art
Cleaning and Beautifying the Yard
The Use of Decorative Tiles
Home Life in Painting
The Purpose of Sculpture
Fireproof Construction of Buildings
Steel and Concrete Construction
Cleanliness and Neatness in School Work
The Study of Mural Painting
Travel and Transportation
Stained Glass and Decorative Windows
Domestic Needs of Family Life
Pictures We Like To Live With
Paul Revere, the Silversmith
Genre Painting

Visit to Sculptor's Studio
Comfortable Furniture for the Home
Paintings of Nature
Heating and Ventilating
The Garage and Service Yard
The Work of Successful Commercial Artists
Famous Sculptors
Interior Decoration as Vocation
Newspaper and Magazine Art
Metal Hardware
Famous Books
Materials Used by Artists
Textile Design
The Appearance of School Grounds
Harmony in Household Furnishings
Decorative Ornament in Architecture
Monumental Architecture
Pictures and Sculpture for School Use
Famous Art Galleries
Local Beauty Spots
The Art of the School Magazine
The Art of the Costume
Office Furniture
Costume Design in Industry
Cathedrals of Europe
Study of Synthetic Materials Used in Industry
Vocational Requirements for Commercial Artists
Study of Historic Plays and Tableaux
Study of Landscape Painting
Study of Laws of Color Harmony
The Industrial Worker in Paintings
The Vocational Possibilities of Art
Selection of Picture Frames
Problems in Art Appreciation
Influence of Historic Periods on Contemporary Architecture and Ornament
Appreciation of a Few Masterpieces
Field Trips to Observe Beauty
Assigned Reading in Magazines and Art Books
Principles of Interior Decoration
Study of Etching and Print Making
Making Choices between the Good and Less Good
Essentials of Design
Light and Dark Pattern in Industrial, Pictorial, and Decorative Design
Characteristics and Use of Primary and Secondary Colors
Appreciation of Fine Color Combinations
Study of Textures in Modern Industrial Art

On the last page add other topics which should be included in the projects and activities of the seventh- and eighth-grade art program.

Few general historical references have been included in Group I. The more specific historical subjects are included in Group II.

Please indicate by check mark ($\surd$) the advanced and specific historical phases of study appropriate for grades 7 and 8.

LIST II

Special Topics Relating to Art History

Early American Crafts
Religious Paintings
Primitive Pottery
Why Pictures Are Called Great
Japanese Prints
Historic Period Furnishings
Historic Architecture
Designs of Thomas Sheraton
Study of Egyptian Art
Classic Architectural Motifs
Evolution of Methods of Painting
The Work of Benevenuto Cellini
The Use of Color by Florentine and Venetian Artists
Famous Examples of Architecture
The Art of Luca Della Robbia
Early American Furniture
Fresco Painting
Mayan Art
The Art of the American Indian
Classic Art
The Relation of Religion to Art
Portraits of Famous Persons
Study of Primitive Motifs
Chinese Art
Renaissance Painting in Italy
Historic Costume
The Orders of Architecture
Douris, the Greek Craftsman
Peasant Art
Historic Use of the Tree of Life
Mosaics of Christian Rome
Illuminated Manuscripts
Coptic Weaving
Renaissance Art
Gothic Art
Modern Art
Oriental Art

On the last page add other historical topics which should be included in the art program for the seventh and eighth grades.

Please indicate by check ($\surd$) mark the creative and manipulative activities appropriate for a general art course for grades 7 and 8.

LIST III

CREATIVE AND MANIPULATIVE ACTIVITIES

Brush Drawing
Naturalistic Design
Use of Value Scale in Drawing
Painting of Landscapes, Summer and Winter
Design and Make Christmas Gifts
Making Scrapbooks for Clippings
Circus Motifs in Design
Figure Drawing at the Seashore
Flat Washes in Water Color
Designs for Valentines
Weaving
Drill on Color Harmony
Making Flower Receptacles in Pottery
Diagrammatic Drawings
Cardboard Models for Architecture
Crayon Painting on Fabric
Clay Modelling
Drill on Color Theory
Designing Costumes for the Masqued Ball
Back-to-Shool Poster
Design and Make Wooden Toys
Shades and Shadows
Thanksgiving Poster
Designing Electric Light Fixtures
Plant and Nature Drawing
The Art of Theatrical Makeup
Original Designs for Churches and Buildings
Painting and Decorating Furniture
Making a Paper Book Cover
Freehand Lettering and Design
Model in Clay Bird Baths, Sundials, Fountains
Design Motifs to Fit Certain Spaces
Making Original Design for Craft Projects
Sketches and Drawings of City Life
Hallowe'en Motif in Design
Designs for Cross-Stitch
Collecting and Mounting Illustrative Material
Artistic Rendering of Decorative Subjects
Bookbinding
Making Garden Plans
Sketching Scenes at the Picnic
Design and Make Wall Hanging
Fireworks as Design Motifs
Arrangement of Bulletin Boards
Making Lampshades
Figure Drawing
Parallel Perspective of Rooms
Designing Monograms
Painting Scenes at Night
Making Raffia Baskets
Single-Stroke Letters
Pen-and-Ink Drawings
Posters Illustrating Scouts and Camping
Making Miniature Rooms and Furnishings
Costumes for Columbus Day Pageant
Make and Paint Baskets of Wood
Illustration of Stories
Designs for Easter Cards
Matching Colors Found in Paintings
Lettering Show Cards and Posters
Drawing from Casts
Writing Texts for Advertisements
Making Gesso Decoration
Arrange School Work for Exhibition
Block Printing
Drawing from Memory
Light and Shadow in Art
Making Designs for Bead Work
Pictorial Composition
Binding Books with Leather
Anatomical Drawing
Designing Simple Jewelry
Decorate Fabric with Batik
Pencil Sketching
Metal Craft Etching with Acid
Making Marbled Paper
Making Working Drawings
Making Convenient House Plans
Drill on Use of Lettering Pens
Designing Stage Scenery and Properties
Making Hand-Made Paper
Isometric Drawings
Designing and Making Greeting Cards
Making Charcoal Drawings
Making Soap Carvings
Designing Coins and Medals
Water Color Rendering
Making Articles of Hammered Brass
Painting Tin or Wooden Objects
Making Silhouettes
Painting Color Schemes for Interior Decoration
Making Place Cards and Party Favors
Making Sealing-Wax Ornament
Animal Drawing
Making Designs for Pottery
Cut Paper Design for Posters
Tooling Leather
Drawing Cartoons
Making Designs for Embroidery
Drawing Science Apparatus
Decorative Composition
Orthographic Projection
Making Objects with Punched Metal Ornaments
Drill on Perspective
Making Spatter Prints
Planning Flower and Vegetable Gardens
Spacing the Printed Page
Designing Stage Costumes
Scale Drawings
Metal Craft Raising and Soldering
Original Designs for Domestic Architecture
Designing Decorative Initials
Making Masques
Making the Sewed Book
Drawing in Accented Outline
Plaster Casting
Tempera Painting
Making Calendar Pads and Blotter Pads
Designs for Electric Sign Advertising
Convenient Arrangements of Furniture
Designing Numerals
Making Class Banners and Insignias
Designing Display Window or Shelf
Arrangement of Mantel or Bookcase Top
Coöperating with the School by Making Posters
Scientific Drawing
Designing Automobile Emblems

Designing Title Page for Book
Painting Atmospheric Effects
Making Tie and Dye
Making Wooden Paper Knife
Binding Notes for History and Other Subjects
Diagramming Line Structure in Paintings
Designing All-Over Patterns
Making Decorative Headdresses for Stage
Making Designs for Borders
Painting with Oils
Arranging Flowers in the Schoolroom
Making Window Boxes for the School
Making Stencils
Making Color Schemes for Schoolrooms
Designing for the Jacquard Loom
Mounting and Filing Illustrative Material
Making and Painting Screens
Designing and Producing Puppet Shows
The Fire Engine as Design Motif
Designing and Making Book-Ends
Decorating the Blackboard
Designing Decorative Panels
Making Air Mail Posters
Making Posters and Designs for Patriotic Days
Making Signs and Posters for School Events
Color Harmonies in Dress Design
Making Designs for the School Magazine
Designing the Ensemble for Street Wear
Stick-Printing Designs
Making Fashion Drawings
Decorating Schoolrooms for Social Affairs
Designing Graduation Dresses
Making Posters for Armistice Day
Making Decorative Papers
Designing the School Costume
Making a Christmas Poster
Illustrating Art Principles in Dress
Designing Labels and Wrappers for Commodities
Making Color Charts
Combining Complementary Colors
Making Rhythmic Arrangements in Design
Making Blended Washes in Water Color
Using Analogous Color Schemes
Designing Bill and Letterheads
Designing in Light and Dark and Color
Project in Marionettes
Posting Illustrations on Bulletin Board

Add here other creative and manipulative activities that should be included in the seventh- and eighth-grade art work.

Would you be willing to answer a brief follow-up questionnaire if such should become necessary in connection with this study? Yes [ ] No [ ]

One hundred and twenty-two replies were received from the questionnaire from teachers widely scattered throughout the country. The results indicate clearly that certain topics are considered of major importance as instructional material for the Junior high school. The following list of subjects was compiled by classifying the various items of subject matter content and securing the frequency of approval of teachers in the field. The tabulation shows the average number of mentions in per cent for all topics enumerated in the questionnaire, as classified under sixteen headings.

Appropriate Topics of Instruction for The Junior High School

Instruction in Elements and Principles of Art	77.8
Appreciation	75.4
Lettering	70.2
Color Theory	70.0
Design	66.6
Drawing and Painting	55.8
Book Art	54.8
Advertising Art	52.8
Sculpture	50.0
Picture Study	41.7
History of Art	41.7
Home Art	41.5
Construction (or Industrial Art)	38.7
Costume or Art in Dress	36.6
Civic or Community Art	36.1
Theatre Art	34.0

These data show that instruction in the elements and principles of art and general art appreciation received the highest average frequency of mention. This fact is significant in a study of this nature aiming to determine types of subject matter appropriate for a general art course in the high school.

In general there is a fair index of agreement in the averages of all subjects listed. It would seem that instruction in the elements and principles of art, appreciation, lettering, color theory, design, drawing, and painting, and the knowledge and understanding of art necessary for efficient daily living should be included in some form in a general art course for the junior high school. And that book

art, advertising art, sculpture, picture study, history of art, home art, construction or industrial art, costume or dress art, civic and community art, and theatre art are outstanding topics in the minds of these teachers. The lowness of the score in some cases may be due to the newness of the subjects listed or to their more appropriate placement in large city schools rather than as subjects for all schools.

While this investigation does not settle the question of the best possible type of general art course for the high school, it does give a definite impression of some of the topics upon which attention may be centered in order to develop suitable units of instruction for the junior high school.

The following table gives the individual topics and activities receiving a high frequency index in the list of three hundred and thirty-one items of the questionnaire. These topics surely should receive consideration in the various units to be organized for the course.

LIST OF INDIVIDUAL TOPICS HAVING GREATEST FREQUENCY INDEX IN THE QUESTIONNAIRE

Freehand Lettering	90
Nature Drawing	84
Principles of Design or Composition	79
Borders and Pattern Design	78
Posters	78
Art Principles in Daily Life	78
Beauty Found in Nature	75
Animal Drawing	72
Cleanliness and Neatness	72
Composition	70
Pictures as Decoration	70
Choice Illustrations	70
Color Harmonies	69
Original Craft Design	68
Poster Lettering	68
Wall Hangings	68
Book Covers	68
Purpose of Design	68
Conventional Design	68
Applied Design	68
Greeting Cards	67
Brush Drawing	67
Design to Fit Shape	67
Pencil Drawing	66
Original Color Schemes	64
Color in Posters	6
Water Color Rendering	6
Making Choices between Good and Less Good	6
Show Cards	6
Figure Drawing	6
Narrative Illustration	6
Clay Modelling	6
Flower Arrangements	6
Local Beauty Spots	6
Color in Dress	5
Tone in Design	5
Color Charts	5
Beautiful Yards and Gardens	5
Appreciation of Paintings	5
Tone Drawing (Use of Value Scale)	4
Field Trips to Observe Beauty	4
Color in Paintings	4
Tone in Paintings	4
Interior Decoration	3

The following problems in construction, art crafts or industrial art were mentioned with sufficient frequency to warrant their consideration in a general art course.

Block Printing	7
Greeting Cards	7
Soap Carving	7
Making Portfolios	5
Making Toys	5
Place Cards and Favors	5
Pottery	5
Textiles	4
Marbled Paper	4
Painting on Wood	4
Batik (tie and dye)	4
Stencil	4
Cardboard Construction	3

Many seasonal and holiday projects and special type activities were mentioned. Material of this nature would of course be included in most art programs.

An analysis of the two lists indicates that the topics which seem most appropriate for the general art course are those which give opportunity for application of elements and principles of art and understanding and appreciation of art necessary for meeting the needs of daily life. Hence it seemed desirable to experiment with the kind of training which could be undertaken in respect to elements and principles and understand-

g and appreciation of art as a basis for e later work of the course.

Color theory—an outstanding topic.—f all the topics mentioned in the questionnaire and in the listing of topics om fifty courses of study, *color* or *lor theory* stands paramount as an element for expansion in all work. For is reason it was decided to develop an perimental unit on color and later to velop other units dealing with the elents and principles of art as a basic troduction to the work of the course.

Organizing the unit on color.—It was so apparent from the results of the estionnaire that the *appreciation* type it is more appropriate than the *science* the *practical arts* type for the objecves established for the course. However, appreciation will tend to be richer d more complete if accompanied by arning factors and creative and mapulative experiences in regard to color. or this reason the pattern for units lopted by the Committee on Standrds for the Re-organization of Secndary School Curricula has been fol-wed in organizing the unit. The major vision of the material includes:

1. Acquiring fruitful knowledge.
2. Development of attitudes, interests, ideals, and appreciations.
3. Development of mental techniques.
4. Acquiring right habits and useful skills in living.

These objectives have been incorpoated into a well-rounded program of upil activities and experiences in regard o the concept of color.

The material which has been compiled or the unit on color was secured by a areful analysis of all available courses f study, books, and magazine articles ealing with the subject of color. A tudy of this material was made to determine types of color and color knowldge employed at the present time in eaching the subject in the schools and the kinds of knowledge necessary for an efficient use of color in daily life.

It is believed that we have secured in this way the basic and fundamental concepts necessary for establishing color understanding and appreciation as a background for all later art work involving color. Many additional units on color, may, of course, be developed to extend the application of knowledge for particular and specific purposes, and the practical uses of color into the ever-widening realm of art.

Grade placement of the unit.—The Sub-Committee on Art has tried to produce a unit which presents only the "minimum essentials" of color knowledge and the application of this knowledge to school and life needs. It is an introductory unit for the study of color. For this reason it should be given as far down in the high school program as possible.

Inasmuch as 70 per cent of the teachers replying to the questionnaire checked *color-theory* as a topic which "should be included without question in a general art course for the junior high school," (see page 429) it seemed desirable to present the basic theory of color in the unit for purposes of experimentation.

At the present time there is no textbook on color covering the material of the unit simple enough for use by pupils in the junior high schools. Hence a tentative unit using the best text material available has been developed without grade placement.

The "Experimental Unit on Color" is published in this issue of the Quarterly. Reprints will be sent to 122 teachers who coöperated in the preliminary study to determine types of instruction appropriate for the junior high school. Reports from these teachers will enable the committee to state specifically whether the unit with modifications can be used in the upper grades of the junior high school or whether it should be used in

an introductory course for the senior high school.

BIBLIOGRAPHY FOR STUDY OF THE GENERAL ART COURSE

BECK, MINNA MCLEOD. *Better Citizenship through Art Training.* Chicago, Illinois: A. C. McClurg & Co., 1921.

BROWN, H. H., and others. *Applied Drawing.* Chicago, Illinois: Mentzer Bush & Co., 1916.

COCKRELL, DURA B. *Introduction to Art.* New York: Richard R. Smith, 1930.

DEGARMO, CHARLES. *Aesthetic Education.* Syracuse, New York: C. W. Bardeen, 1913.

DEGARMO, CHARLES and WINSLOW, LEON L. *Essentials of Design.* New York: The Macmillan Company, 1924.

GOLDSTEIN, HARRIET and VETTA. *Art in Everyday Life.* New York: The Macmillan Company, 1925.

HAYWARD, FRANK H. *The Lesson in Appreciation.* New York: The Macmillan Company, 1925.

LEMOS, PEDRO J. *Applied Art.* Mountain V[illegible] California: Pacific Press Association, 1[illegible] Academic Grades, pp. 217–379.

RUSSELL, MABLE and WILSON, ELSIE. *Training through Home Problems.* Pec[illegible] Illinois: The Manual Arts Press. (In Pre[illegible]

TRILLING, MABLE B. and WILLIAMS, FLOREN[illegible] *Art in Home and Clothing.* Philadelp[illegible] Pennsylvania: J. B. Lippincott Compa[illegible] 1928.

WHITFORD, WILLIAM G. *An Introduction [illegible] Art Education.* New York: D Appleton [illegible] Company, 1929. Chapter X, "The Prob[illegible] of Differentiation and Standardization Art Work in Modern High Schools," 127–38. Chapter XI, "Objectives and P[illegible] for Course of Study in Art for the Seco[illegible] ary School," pp. 139–59. Chapter XII, "T[illegible] General Art (Appreciation) Course for H[illegible] Schools," pp. 160–74.

WINSLOW, LEON L. *Organization and Teach[illegible] of Art.* Baltimore, Maryland: Warw[illegible] and York, Inc., 1928. Chapter VI, "T[illegible] Secondary Course of Study, pp. 87–142.

The Teaching of Science in Secondary Schools[1]

A Research Study

FRANCIS D. CURTIS
University of Michigan

STATEMENT OF THE PROBLEM

This investigation was undertaken by author at the request of the President d the Executive Committee of the rth Central Association of Colleges d Secondary Schools, in order to ascer- n the actual conditions and practices isting with respect to the teaching of ence in the secondary schools accred- d by the Association.

METHOD

Two methods of research are avail- e to the investigator in assembling tistical data of the sort desired in this dy: the survey method and the ques- nnaire method. With the survey thod the investigator gathers the de- ed facts by personal observation, by erviews, and by examination of orig- l records and reports; with the ques- nnaire method the investigator secures facts he desires from answers to a of specific questions. Obviously if fficient care is used, the survey method practically certain to insure results lich are more accurate and complete n can be obtained by use of the ques- nnaire method; but the difficulties en- ed in its use, together with the ex- nse in time and money demanded in rrying through a survey, render this thod impracticable for a limited in- stigation such as this one. Hence, the estionnaire method was employed in s study.

During the spring of 1930 the investigator prepared an extensive list of items of information which it seemed desirable to secure with respect to the teaching of science in a group of highly selected secondary schools. After discussing this list with several members of the Executive Committee of the North Central Association and with various teachers of science in order to make sure that the list was sufficiently complete and that every item contained was of sufficient importance to warrant its inclusion, the investigator prepared a tentative draft of two blanks. The first of these, addressed to the superintendent or principal, included all the general items concerning which information was sought; while the second, addressed to the teacher of science, included all of the specific items. The investigator then secured the coöperation of several heads of secondary schools and of a number of teachers of science in these schools, who consented to test the adequacy of the blanks by filling them out and by making criticisms and suggestions for their improvement. The final forms of the two blanks, which together constituted the complete questionnaire used in this investigation, were prepared by revising the trial drafts in the light of the criticisms and suggestions submitted.

The "General Information" blank contained the following items: Name and location of the school; population of city; type of school (3 yr., 4 yr., 5 yr., 6 yr.); total enrollment in the school; grades included in the school; grades included in the report; number of teachers teaching one or more classes of high

[1] As the author says, this is a study of the ence work carried on in North Central As- iation schools. Space, however, has pre- led the publication here of the entire report its original form. This fact is very much lored.—The Editor.

school science; grade placement of each science taught in the school; list of *required* courses in science and the number of years' work required in each; length of class period; and the grade in which General Science is offered (if at all) *below* the high school, if not offered in the high school reporting.

The second blank, entitled "Report of Science Teaching," was intended to be furnished every teacher in the school who was teaching *one or more* classes in science, whether such teachers were regular teachers of science or not. This blank contained the following items: sex of teachers; salary; present official position; total number of years' experience as a classroom teacher in specified types of schools; total numbers of years' experience in the teaching of *science* in each of the specified types of schools; total number of years' experience in the present school; degrees—when and where obtained; total number of semester hours credit in Education—undergraduate and graduate separately; total number of semester hours of practice teaching; total number of semester hours credit in science (each science being listed separately and reported on for undergraduate and graduate work); collegiate work being pursued at the present time, together with degree sought, college directing the work, and method of study (summer session, correspondence, or extension). Then follows outlines and blank spaces for recording the teacher's teaching program for each period of each day of the week, together with the enrollment (by sexes) in each class.

The last nine questions about which information was sought may perhaps best be indicated by quoting them entire. They are as follows (space being left of course in each instance for detailed answers).

1. Please write the name of each science course you are teaching this semester. Write *a* in the parenthesis after it if *no* laboratory experiments are performed in connection with the course; write *b* if laboratory work part of the course and if also the pu themselves perform *all* of these labora experiments; write *c* if you, yourself, den strate *all* of these experiments; write you demonstrate some and allow pupils demonstrate all the rest; write *e* if the pu themselves perform certain of the exp ments and you or the pupils demonst others to the group. Thus, *Chemistry* would mean that your second semester c in regular chemistry has laboratory w all of the experiments being performed the pupils themselves. Do not include laboratory work incidental demonstrati made to illustrate the recitation or cl work, unless the pupils are required to m written reports of such demonstrations to considered as laboratory experiments; if pupils do make written reports of any these demonstrated experiments, write *c* or *e*, as the case may be.

2. Please write the name of each course are teaching this semester, with which pupils perform some or all of the labo tory experiments themselves. Write *a* in parentheses if the pupils all perform same experiment at the same time, that if the "even front" method of individ laboratory experimentation is used; writ in the parentheses if different pupils w upon different experiments during the sa period.

3. Please write the name of each course are teaching this semester, in which some the laboratory experiments are performed the pupils themselves while others are monstrated but are required to be written as laboratory reports. Write in the paren ses the approximate percentages of the periments which are performed by e method. Thus, *Physics*[1] (*i*,80; *d*,20) wo mean that approximately four out of five the laboratory experiments are performed the pupils themselves while one out of ev five is demonstrated before the class but written up by every pupil as a regular la oratory exercise.

4. Please write the name of each course y are teaching this semester, in which the p pils themselves perform some laboratory e periments. Write in the parentheses after *a* if the pupils perform these laboratory e periments singly; write *b* if they perfo the experiments in pairs; *c* if they perfo the experiments in groups of three or mo or if you use a combination of these pla please indicate which; for example, *ab* wou

ndicate that some of the experiments were performed individually and the rest by the pupils in pairs.

Please write the name of every science course you are teaching this semester. Write in the parentheses after it *a*, if the course follows one textbook; write *b* if it follows a syllabus based upon one textbook but with several other textbooks for supplementary references; or write *c* if it follows a syllabus based upon no one textbook but with several textbooks used for references.

Please write *a* after the name of each science course you are teaching, with which you use periodical literature as Popular Science, Current Science, The Science Classroom, etc., as a *regular* part of the instructional materials; write *b* after the name of the science course if you introduce such periodical literature only occasionally as instructional materials.

Please indicate any duties concerned with extra-curricular activities, such as coaching athletics, coaching dramatics, sponsoring a science club, etc., which you assume in addition to your teaching.

Please indicate the educational magazines which you read; write in the parentheses after the name of the magazine *r* if you read the magazine regularly, or *o* if you read it occasionally.

Please indicate the technical scientific journals and magazines which you read; write in the parentheses after the name of each magazine *r* if you read it regularly, or write if you read it occasionally.

A copy of the administrator's blank (Blank No. 1) and a number of copies of the teacher's blank (Blank No. 2), estimated from the statistical data in the issue of The North Central QUARTERLY for June, 1929, to be sufficient to supply one for each science teacher in each school, were sent to every secondary school in the Association. A printed postal card addressed to the investigator was provided with a blank in which the administrator who received an insufficient supply of blanks might indicate the number of additional copies of the teacher's blank needed, was enclosed in the original package of blanks.

As rapidly as the returns were received, the schools represented were checked against a master list and follow-up letters, were dispatched to those schools from which incomplete returns were received.

During the progress of the investigation a total of more than nine thousand copies of the teacher's blank were sent to the 2167 accredited secondary schools of the Association. On the whole the response of the administraters was prompt and cordial. Sets of blanks were returned from 1802 or 83.1 per cent of the schools and from 5481 teachers of science in these schools. All types of secondary schools accredited by the North Central Association are represented in these reports.

In tabulating the data it seemed desirable as a means of facilitating reference and comparison to divide the schools into nine groups according to size of enrollment. These groups with the respective ranges of pupil enrollment of the schools included in each group follow:

Group	*Range of Pupil Enrollment*
I	1 - 50
II	51 - 100
III	101 - 150
IV	151 - 250
V	251 - 500
VI	501 - 1,000
VII	1,001 - 2,000
VIII	2,001 - 3,500
IX	More than 3,500

Thus, Group I includes all of the schools having a total pupil enrollment of fewer than 51 pupils; Group II includes all of the schools having a total enrollment of between 51 and 100 pupils, etc.

Because of space limitations and of the great expense involved in publishing extensive tables only a relatively small number of tables is included in this ab-

breviated report of the investigation. The separate data for the nine groups of schools, moreover, are given in only a few of these tables. The tables in the latter part of this report dealing with the teaching of the various branches of science are limited to data bearing upon only biology, chemistry, general science and physics. The discussions accompanying these tables, therefore, include some items taken from the complete data which these abbreviated tables do not include and are concerned with conditions and practices in connection with the other branches of science or with conditions with respect to the teaching of science in the various groups of schools.

Single items of information, here and there, were unsupplied on a considerable number of blanks; consequently in the tables that follow, no single item of information is complete for all the teach represented in this study. In each tal therefore, the number of blanks fr which that particular item was taken indicated.

FINDINGS

Table I is a somewhat general ta giving the size, the location by states, a

TABLE I

NUMBERS OF SCHOOLS IN EACH GROUP AND TOTAL NUMBER AND PERCENTAGE OF ACCREDIT SCHOOLS REPRESENTED IN EACH STATE

State	Number of Schools in Group									Total Number of Schools	Per Cent of Schools Repre-sented
	I	II	III	IV	V	VI	VII	VIII	IX		
Arizona	1	4	5	5	5	5	1	....	1	27	77.1
Arkansas	3	4	4	21	11	2	1	....	....	46	88.5
Colorado	1	9	16	13	18	11	6	....	....	74	81.2
Illinois	3	35	36	41	60	38	22	11	12	258	84.0
Indiana	....	....	4	11	28	24	15	2	1	85	86.8
Iowa	....	5	9	38	33	14	7	....	....	106	75.7
Kansas	....	8	22	37	24	22	6	....	....	119	86.2
Michigan	1	8	4	34	60	29	22	11	2	171	96.1
Minnesota	....	3	4	21	29	17	4	8	....	86	93.5
Missouri	3	7	12	19	22	12	13	5	....	93	78.2
Montana	....	3	3	10	6	5	4	....	....	31	75.6
Nebraska	3	11	9	36	16	5	1	2	1	84	75.0
New Mexico	2	5	2	10	7	....	1	....	....	27	87.1
North Dakota	1	20	12	8	6	2	1	....	....	50	69.5
Ohio	2	18	21	50	65	40	33	14	2	245	86.3
Oklahoma	2	6	7	14	25	11	6	1	....	72	66.1
South Dakota	1	8	11	15	13	2	1	....	....	51	79.7
West Virginia	....	2	2	19	18	12	7	....	....	60	92.3
Wisconsin	2	3	2	24	36	12	18	1	....	98	87.5
Wyoming	....	1	3	7	5	3	....	....	....	19	70.4
Total	25	160	188	433	487	266	169	55	19	1802	83.1

the grouping of the schools represent in this investigation. Beginning at t top and reading across we find that A zona is represented in this study by school in Group I—that is by 1 scho having a total enrollment of fewer th 51 pupils; by 4 schools in Group II ha ing each a total enrollment of between and 100 pupils; by 5 schools in Gro III having each a total enrollment of b tween 101 and 150 pupils, etc. Arizo is represented by a total of 27 schoo which constitute 77.1 per cent of its s

dary schools which are accredited by North Central Association. Reading tically, we note that in Group I there 25 schools from all the states; in oup II, there are 160 schools, etc. Of 2167 schools accredited by the Associon at the time the data were collected, 02 or 83.1 per cent are represented in s study.

t will be seen from Table I that there relatively few schools in the smallest l the largest groups—respectively 25,), 55, and 19 schools in Groups I, II, II, and IX. Moreover only 13 of the nty states in the Association are repented by schools in Group I; only six represented by schools in Group IX; l of the six so represented Illinois has lve.

llinois and Ohio with, respectively, and 245 schools have the largest repntations of the twenty states; Wyom-, Arizona and New Mexico, with reictively 19, 27 and 27 schools, have the allest representations in this report. chigan is represented by the largest centage of its *accredited* secondary ools, namely 96.1 per cent; Oklahoma represented by the smallest percentage its accredited schools, namely 66.1 per t.

As these schools have been arbitrarily uped by the investigator, the largest nber, 487 or 27.5 per cent, fall in oup V, which includes those having ollments between 251 and 500 pupils. he number of schools in the first four ups are combined, however, it is seen t 776 or 43.8 per cent have enrollments ewer than 251 pupils. Combining the ls of the last four Groups, moreover, eals the fact that 509 or 38.7 per cent the schools have enrollments in exs of 501 pupils.

GRADE PLACEMENT OF SCIENCE SUBJECTS

Table II shows the number and pertages of the schools in which each of the various science courses was offered[2]

Agriculture was taught in 738 or 41.6 per cent of these schools. Data not included in Table II reveal the fact that this subject was found in all the grades from the seventh to the twelfth, although, on the whole, in those schools in which registration in this subject was restricted to a single grade, agriculture was scheduled most often in the tenth. In most of the schools, however, it was open to election by pupils of two or three grades, usually of the ninth and tenth or of the ninth, tenth and eleventh. In a large number of schools in Group IV, pupils were permitted to study agriculture during any one of the four years of the senior high school. In a considerable number of schools, moreover, more than one year's work in agriculture was offered.

Astronomy was found in only 22 or 1.1 per cent of the schools. It was distinctly an upper-grade subject. In 11 of these schools it was scheduled in the twelfth grade, in 5 for the eleventh or twelfth grades, in 1 for the eleventh grade, and in 2 for the tenth grade.

Biology. Elementary biology was listed in the replies from 260 or 14.6 per cent, and *advanced biology* in the replies from 923 or 52.1 per cent of these schools. There is reason, however, to doubt the accuracy of these figures. Despite the efforts to distinguish in the questionnaire between *elementary biology* and the conventional *advanced* or *general biology,* it was obvious from the replies that there was some confusion with respect to these two courses, since the designation of the courses by the principal failed in some cases to agree with that by the biology teachers of the same school. It is obvious that a course in biology distinct from

[2] The conclusions from all of these data are stated in the past tense because the various conditions may have changed somewhat in the interval between the collection of these data, two years ago, and the publishing of this report.

general biology and more elementary has an established place in the secondary schools of the Association, since both courses were found to be offered in 2.2 per cent of these schools and since, also, the biology scheduled for the ninth grade was more often designated in the replies to this questionnaire as "elementary" than as "advanced biology." Nevertheless, from the evidence secured in this study, it is impossible to determine with certainty the schools in which elementary biology, as distinct from advanced or college preparatory biology, was offered. It seems best, therefore, to discuss biology as a single subject.

In a large majority of the schools of every group the study of biology was restricted to pupils of a single grade, usually of the tenth, though not infrequently of the ninth, the eleventh, and in sporadic instances, the twelfth. In certain schools of every group, however, the classes in biology were made up of pupils of more than one grade, usually of the tenth and eleventh or of the upper three grades.

Botany and *Zoölogy* were listed respectively in the reports from 308 or 17.4 and 191 or 10.8 per cent of these schools. One reason to account for the fact that zoölogy appeared less often than botan may be that in many schools these tw courses are given in alternate term zoölogy in the fall and botany in th spring. Since this questionnaire was an swered during the spring semester, seems likely that in some cases zoölog may have been omitted from the list o courses even though it was a regula offering in the science curriculum, an that therefore the figures secured fo botany represented more accurately th

TABLE II

TOTAL NUMBERS AND PERCENTAGES OF SCHOOLS OFFERING VARIOUS COURSES IN SCIENCE

Course	*No. of Schools*	*Percentage of Schools*
Agriculture	738	41.6
Astronomy	22	1.1
Elementary Biology	260	14.6
General Biology	923	52.1
Botany	308	17.4
Chemistry	1251	70.6
General Science	1199	67.7
Geology	55	3.1
Hygiene	399	22.5
Physics	1589	89.7
Physiography	311	17.6
Physiology	521	29.3
Zoölogy	191	10.8

actual number of schools offering this course than was the case for zoölogy. Because these subjects often follow each other in consecutive semesters, the two together constituting a year's work, it seems defensible here to discuss them together.

The proportion of schools offering botany and zoölogy was found to increase somewhat with the size of the school. In the groups of smaller schools,—those in which the size of the school limited the offering in biological sciences to one course,—the course, in a great majority of cases, was biology. In the groups of larger schools,—those in which the enrollment was sufficiently great to permit the offering of more than one biological science,—the proportion of

hools offering botany and zoölogy in-eased; thus, in Groups VIII and IX, otany and zoölogy appeared almost as equently as biology.

In general the placement of botany nd zoölogy followed the practice in-icated with respect to biology. Thus, hen restricted to the pupils of a single rade it was found most often in the nth, though in many schools the classes botany and zoölogy, like those in bi-logy, were made up of pupils of the up-er three grades. It is interesting to ote that, on the whole, the schools that ffered botany and zoölogy in the ninth rade constituted a larger percentage han was the case with the schools offer-ng biology; that is, zoölogy and botany eemed on the whole to be considered omewhat more elementary in character han biology.

Chemistry was listed in the replies rom 1,251 or 70.6 per cent of the schools. t seems likely, however, that both this ercentage and the percentage for physics were somewhat smaller than they should e to represent the total percentages of chools offering these two courses. This ap-ears true because in many small schools hemistry and physics are offered in lternate years. In some of these schools, herefore, either chemistry or physics may have been omitted in the reports be-ause it was not being taught at the time he questionnaire was answered, although t actually had a definite place in the science curriculum of the school.

Chemistry was found to be definitely an upper-grade subject, since it was of-fered in the tenth grade in a negligible number of schools. In a majority of the schools of the three smallest groups the classes in chemistry were composed of pupils in the eleventh and twelfth grades; but in the remaining groups registration in this subject was more often restricted to one grade, though frequently in these schools, as in the groups of smaller schools, the pupils were permitted to study chemistry in either the eleventh or the twelfth grade. Of the schools in which chemistry was definitely assigned to one grade, the subject was found on the whole somewhat more often in the eleventh than in the twelfth grade; this tendency was most pronounced in the schools of Groups IV, V, VI, and VII. In the schools of Groups VIII and IX, however, this sequence was reversed; that is, in a majority of the schools of these two groups chemistry was assigned to the twelfth rather than to the eleventh grade.

General science appeared in the science curricula of 1199 or 76.7 per cent of the schools. The fact, however, that general science is offered below the ninth grade in a considerable number of school systems organized on the 8-4 plan renders this percentage too small to indicate truly the extent to which that subject was taught in the cities represented by these schools of the Association. Proof of this statement is provided in the response to the request, on the Principal's blank for information indicating whether general science was offered below the high school. In reply, 137 administrators, representing schools in all the groups, stated that this subject was offered *below* but not *in* their schools, while 55 others, representing all groups except IX, stated that it was offered both *in* and *below* their high school grades.

In the schools which replied to this questionnaire, general science was definitely a ninth-grade subject, since in considerably more than half of these schools, enrollment in this subject was limited to pupils of the ninth grade. The definite assignment of general science to the ninth grade, moreover, exceeded the frequency of assignment to this grade of all other sciences combined.

In the schools in which pupils in the upper three grades were permitted to

study this subject, it was in a few cases definitely scheduled for the tenth grade, and in only two schools, for the eleventh grade. In the rest of the schools its election was limited to pupils in the ninth and tenth, or in an occasional school, it was open to pupils of the upper four grades. The subject was limited to pupils of the seventh grade in only two schools which did not include a four-year high school, though in a considerable number of such schools it was limited to pupils of the eighth grade. About an equal number offered the subject in one of three sequences: in the seventh and eighth grades, in the eighth and ninth grades, or in the seventh, eighth, and ninth grades.

Geology was offered in 55 or 3.1 per cent of the schools and these schools are located chiefly in the mountain states, Colorado and Montana. This subject was confined almost wholly to the eleventh and twelfth grades, though there were a few schools in which it was offered in the tenth grade. It was also scheduled in the ninth grade on the programs of four other schools.

Hygiene was found as a separate subject in 399 or 22.5 per cent of the schools. In these, the subject had no definite placement; it was scheduled in all the grades from the seventh through the twelfth and was found with about equal frequency in all of these grades. Unlike botany and zoölogy, hygiene, when considered in respect to the frequency with which it was included in the curriculum, was apparently little affected by the size of the school, since it was offered in about the same proportion of the schools of all nine groups.

Physics appeared in the science curricula of 1,589 or 89.7 per cent of the schools. Although this is considerably larger than the percentage representation of any other science course considered in this investigation (see Table II), it probably does not fully represent th true percentage of the schools in whic this subject was taught, for the reaso given in connection with the previou discussion of chemistry.

Like chemistry, physics was found t be distinctly an upper-grade subject an its study to be limited almost wholly t pupils of the eleventh and twelfth grade Exceptions to this placement occurred i only 13 schools, in most of which it wa open to pupils of both the ninth an tenth grades. In one school in Grou VII, however, physics was apparentl taught as a junior high school subjec since it was open to pupils of the seventh and eighth grades. In the schools of a the groups except VIII and IX, physic was definitely scheduled for the twelft grade more often than for the eleventh

Physiography was reported in the re plies from 311 or 17.6 per cent of th schools. This subject was found i schools of all the groups except Group I It had no definite grade placement. O the whole, in all the groups except II III and IX, its election was limited t the pupils of the ninth grade far les frequently than it was open to the pupil in any of the upper three grades; i Groups IV, V, and VIII it was definitel scheduled for the tenth grade in ap proximately as many schools as for th ninth; while in Groups VI and VII i was much more frequently found in th tenth than in the ninth grade. Thes data would seem to indicate, therefore that in these schools of the Association physiography was, on the whole, re garded as a subject for the upper high school grades.

Physiology appeared as a separate sub ject in the reports of 521 or 29.3 pe cent of the schools. Almost exactly hal of the schools reporting physiology, how ever, are located in Illinois, in which state one-half unit of physiology is re quired by law to be taught in all high

hools. This subject seems to have no finite grade placement, since it was und in all the grades from the seventh rough the twelfth. While it was not heduled conspicuously more often for y one grade than for the others, as as the case with general science, phys- s and chemistry, it was somewhat more ten found in either grade ten or grade even than in grade nine. Moreover, hen the number of schools in which the were found in a majority of the high schools. Further, although there were many exceptions within the various groups, on the whole these four subjects had a definite grade placement and may be said to have constituted, for the four-year high school at least, a definite sequence. This sequence included general science in the ninth grade, biology in the tenth grade, and physics and chemistry in the eleventh and the twelfth grades.

TABLE III

PERCENTAGES OF THE TOTAL NUMBER OF SCHOOLS REQUIRING THE RESPECTIVE NUMBERS OF UNITS OF SCIENCE INDICATED

Units Required	*Percentage of Schools*	*Units Required*	*Percentage of Schools*
0	6.4	3	6.2
½	.4	3½	.1
1	52.7	4	1.6
1½	1.5	5	.05
2	30.0	6	.1
2½	1.0		

upils of the tenth and eleventh grades, of the upper three grades, were per- itted to study the subject are combined ith those in which the enrollment in ysiology was limited to pupils of the nth, the eleventh or the twelfth grade, e subject is seen, on the whole, to be garded as an upper-grade course.

Miscellaneous courses. As would be xpected in so large a number of schools, epresenting as they do so wide a variety f environments, occasional offerings of nique courses were reported. Thus nitation was found in the curricula of ree of the schools, while mining, house- old chemistry, metallurgy, bacteriology, pplied science, qualitative analysis, lementary science and elementary phys- al science (as distinguished from the onventional general science), and pho- ography were each found in the science urriculum of one school.

Summary. The data of this study in- icate that only four science courses

COURSES IN SCIENCE REQUIRED FOR GRADUATION

Table III shows the percentages of the secondary schools in which certain numbers of years of science were required for graduation. The table reveals the fact that these requirements ranged in the various schools from none whatever to six years. A few schools were found in every group, except I and IX, in which no science whatever was required for graduation. In 52.7 per cent, or in slightly more than half of the schools, one year was required, while in 30.0 per cent of the schools two years were required. All but 6.8 per cent required one or more years of science for graduation. The requirements of science were found to be approximately uniform throughout the nine groups of schools.

Practically every science course listed was a requirement in some school or schools. It is impossible here to present the variations in the required courses

TABLE IV

SALARIES OF MEN AND WOMEN TEACHERS OF SCIENCE IN THE NINE GROUPS OF SCHOOLS AND TOTAL NUMBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF SCIENCE IN EACH SALARY GROUP*

Salary Group	School Group									Total	Per Cent
	I	II	III	IV	V	VI	VII	VIII	IX		
No Salary											
Men	1	0	7	6	11	16	0	0	0	41	1.1
Women	1	29	19	25	24	8	6	0	0	112	7.0
Below $1,000											
Men	0	0	2	3	7	0	0	0	0	12	.3
Women	0	0	0	6	2	0	0	0	0	8	.5
$1,000–$1,250											
Men	0	1	1	11	16	6	2	3	1	41	1.1
Women	0	7	10	29	34	7	5	0	0	92	6.0
$1,251–$1,500											
Men	3	20	37	118	122	43	18	2	0	363	10.1
Women	3	41	62	132	190	88	23	9	3	551	34.5
$1,501–$1,750											
Men	2	32	49	105	175	85	48	13	3	512	14.2
Women	4	9	10	35	76	59	38	6	0	237	14.7
$1,751–$2,000											
Men	3	25	53	153	234	177	103	17	11	776	21.5
Women	2	4	6	13	31	38	70	26	0	190	12.0
$2.001–$2,250											
Men	0	24	25	77	115	109	95	15	7	467	12.9
Women	1	5	2	6	8	16	22	25	1	86	5.4
$2,251–$2,500											
Men	6	22	28	60	107	93	123	58	27	524	14.5
Women	0	4	3	1	1	9	29	25	9	81	5.1
$2,501–$2,750											
Men	0	6	21	33	45	26	70	59	22	282	7.8
Women	0	1	2	2	0	3	20	23	11	52	3.3
$2,751–$3,000											
Men	2	6	15	16	38	30	75	47	31	260	7.2
Women	0	0	0	1	1	5	15	25	14	61	3.8
$3,001–$3,500											
Men	0	2	5	12	13	25	42	45	24	168	4.8
Women	0	0	0	0	1	1	12	21	17	52	3.3
$3,501–$4,000											
Men	0	1	2	7	5	6	29	35	57	142	4.1
Women	0	0	0	0	0	5	8	15	41	69	4.3
Over $4,000											
Men	0	0	0	0	4	3	4	6	0	17	.5
Women	0	0	0	0	0	0	0	1	0	1	.1
Total										5,197	

* A considerable number of women and a smaller number of men teaching in private schools received board and room as part of their salaries. Since several of these stated that board and room was considered to be equivalent to $450, this sum was in every such case added to the actual salary in money received, and the teacher was counted in the salary group in which this sum placed him.

in the combinations of required rses in these schools. In those in ich the requirement for graduation s more than a single year, there were rly two hundred different combina- s of required science courses. Most these requirements were stated specifi- y, though in most schools some lati- e of choice was allowed among sev- l designated courses. In 7.9 per cent the schools, however, the pupil was mitted to choose any course in science ered.

The four major[3] courses, namely, eral science, biology, physics, and mistry, were required more fre- ntly than any of the others. Chem- y and physics were more often found ed among the required course than logy, while the three "laboratory rses" were required somewhat more quently than general science. Of the nor subjects, only hygiene, agriculture, any, zoology, and physiology were en major emphasis; that is, were med first in the statement of required rses in science.

SALARIES

Table IV shows the numbers of men d women in each of the nine groups schools, together with the total num- s and percentages of men and women all the groups, who, at the time they swered the questionnaire,[4] were re- ving the salaries indicated.

Of the 5,197 teachers who stated their aries, 3,605 were men and 1,592 were men. The table shows that the sal- es which these science teachers re- ceived ranged from no actual money whatever, in the case of 153 men and women who were teaching in parochial schools and who constituted 1.1 per cent of the men and 7.0 of the women reporting this item, to more than $4,500 for certain administrators who taught a class or so of science, or for certain college and university teachers who combined teaching in a high school with teaching in a junior college or a university.

The smallest salary received by any full-time teacher of science was that of one woman who reported $720 for her year's work. Only .5 per cent of the women and .3 per cent of the men, or .4 per cent of all these teachers, received salaries of less than $1,000.

On the whole the men were much better paid than the women, though there was found to be a considerable overlapping of the salary-ranges for the two sexes. The modal number of women teachers in these arbitrarily determined salary groups, 551 or 34.5 per cent, received between $1,251 and $1,500; the modal number of men in these groups, 776 or 21.5 per cent, received from $1,751 to $2,000. Exclusive of those in the "no salary" group, 41.0 per cent of the women teachers but only 11.5 per cent of the men teachers received salaries of less than $1,501; while 51.8 per cent of the men teachers and only 25.3 of the women teachers received salaries in excess of $2,000. It will be noted that in general the salaries were larger in the larger schools; also that relatively few of the "high salaried" women as compared with the number of men, who are in the upper salary groups, taught in the smaller schools.

OFFICIAL POSITIONS

Table V briefly summarizes the data relative to the official positions of the 5,066 teachers of one or more classes in science who responded to this item on

[3] In this report the term, "major courses" is d to designate the four branches of science ich appeared most often in the science cur- a of the schools; the term, "minor courses," sed to designate all the other branches of nce named in the replies.

[4] Because of reductions here and there during past two years of economic depression, it ms likely that present salaries are, on the ble, somewhat lower than those reported in ble IV.

the questionnaire. The table is read thus: ten of the individuals who taught in the schools of Group I, 104 who taught in the schools of Group II, etc. designated their official positions as "classroom teacher." Thirteen in Group I, 68 in Group II, etc., stated that they were "Heads of Departments of Science."

An inspection of this table reveals the fact that these teachers may be divided into three groups: those whose primary occupation was classroom instruction (classroom teachers, heads of departments, supervisors, and critic teachers); those whose major duty was administration (superintendents, principals, assistant- or vice-principals, and deans); and those whose chief responsibility was the coaching of athletics. When the data in the last column are combined according to this classification it is found that the percentages of individuals in these three groups are respectively 86.8, 8.5, and 4.8. A more detailed analysis would increase the percentage of the last group at the expense of the first, since some of the heads of departments were also officially in charge of athletics and had as additional duties some teaching, while others had their activities divided between teaching and athletics, but gave "classroom teacher" as their official designation.

It will be noted in the last column of Table V that 28.8 per cent of the teachers responding to this item were heads of departments. An overwhelming majority of these department heads were men, though in the groups of largest schools the numbers of these men and women who were heads of departments are approximately equal. Additional data not included in this table reveal the fact that there were 51 different combinations of subjects included in these various departments. Most of these department heads had charge either of departments of science or of one or more branches of science, such as "physics and chemistry." or "biology and general science." A considerable number, however, were heads of departments which combined one or more branches of science with some other subject having a remote relation or no relation whatever

TABLE V

NUMBERS OF TEACHERS OF ONE OR MORE CLASSES OF SCIENCE IN THE NINE GROUPS OF SCHOOLS WHO HELD CERTAIN OFFICIAL POSITIONS OR TITLES

Title	*I*	*II*	*III*	*IV*	*V*	*VI*	*VII*	*VIII*	*IX*	*Total*	*Per Cent*
Classroom Teacher	10	104	111	288	460	496	609	396	243	2,717	53.6
Head of Department of Science	13	68	109	202	424	317	209	76	40	1,458	28.8
Head of Department Other Than Science	2	12	33	66	60	17	5	2	1	198	3.9
Supervisor	0	2	4	3	3	0	2	1	1	16	.3
Critic Teacher	0	0	0	3	3	0	2	0	1	9	.2
Superintendent	1	16	26	33	8	0	0	0	0	84	1.7
Principal	1	36	36	103	75	4	0	0	1	256	5.1
Assistant or Vice-Principal	0	1	4	13	19	13	9	2	0	61	1.2
Dean	0	2	2	2	8	4	2	3	2	25	.5
Athletic Coach	0	5	29	127	62	11	7	1	0	242	4.8
Total	27	246	354	840	1,122	862	845	481	289	5,066	100.1

cience. Among such are found "head science and athletics," or "head of ogy and French." This tendency to bine the supervision and direction of teaching of science with that of the hing of some other remotely related totally unrelated subject is extremely rimental to the teaching of science, n when the major interest and major paration of the department head is science. There is, however, addihal evidence which is still more disbing from the standpoint of its bear upon the most effective teaching of nce. This appears in the data show that there was in these schools some dency to assign the teaching of sci-e not only to department heads but o to classroom teachers whose major erests and training, as judged from ir official positions as named, were lly divorced from science. Thus 3.9 cent of all the teachers of science re in a group which included heads of dern language, of English, of French, Spanish, of Latin, of social science, commerce and athletics, of mathema-s, of physical education, and of his-y. Of the heads of departments other n of science, 62.3 per cent were men and 27.7 per cent were men.

Those who designated themselves as ssroom teachers reported in subseent items of the questionnaire a much der variety and a much greater pertage of subjects taught along with ence, which bear no relation to science an did the department heads. This ct would seem to leave no doubt that many cases such teachers undertake teach science as an "extra" outside of eir major and minor subjects of specization. Many such assignments are doubt necessitated in the smaller hools by the fact that the limitations on the size of teaching corps imposed a small enrollment render extremely fficult the assignment of classes to ose, only, who are thoroughly prepared to teach them. Nevertheless, from the standpoint of effective science teaching, such practice is to be deplored and even in the smallest schools every administrative effort possible should be made to assign the classes in science only to teachers trained to teach science.

Attention should further be called to the fact that 242 or 4.8 per cent of the teachers of science, mostly in the smaller schools, are officially "athletic coaches" (Table V). While athletic coaches are usually men who, in connection with their training for coaching, are required to study some courses in biological science, nevertheless from the standpoint of adequate preparation for teaching biology, botany, or zoölogy, such training is in most cases more or less fragmentary and superficial; while their training for teaching the physical sciences and general science is usually even less adequate or is practically non-existent.

Only 8.5 per cent of the teachers of science hold positions officially designated as administrative. Practically none of these principals and superintendents were in schools of the upper four groups, that is, those which had enrollments in excess of 500 pupils.

TEACHING EXPERIENCE

Table VI summarizes the data relative to the teaching experience of the teachers of science. The table is read thus: Division A of the table shows that 227, or 6.3 per cent, of the men and 108, or 6.5 per cent of the women were engaged in their first year of teaching experience; Division B shows that 297, or 8.1 per cent, of the men and 210, or 12.9 per cent, of the women were engaged in their first year of teaching science; and Division C shows that 791, or 23.1 per cent, of the men and 354, or 23.0 per cent, of the women were engaged in their first year of teaching in the schools from which the reports were sent.

A comparison of divisions A and B

of Table VI reveals the fact that there is a substantial percentage of the teachers who have had little or no previous experience in teaching and a still larger percentage who had had still more meager experience or none whatever in teaching science. Thus, a combination that 24.7 per cent of the men and 24.[illegible] per cent of the women had taught *science* for more than ten years.

A further comparison of Divisions A and B indicates that many of the teachers had taken up the teaching of science after they had had some experience in

TABLE VI

COMPARISON OF (A) NUMBERS AND PERCENTAGES OF TEACHERS OF SCIENCE REPORTING VARIOUS NUMBERS OF YEARS OF TEACHING EXPERIENCE WITH (B) NUMBERS AND PERCENTAGES OF SAME GROUP OF TEACHERS* REPORTING CORRESPONDING NUMBERS OF YEARS EXPERIENCE IN TEACHING SCIENCE AND (C) OF YEARS IN THEIR PRESENT POSITIONS

	Number of Years' Total Teaching Experience										
	1	*2*	*3*	*4*	*5*	*6-10*	*11-15*	*16-20*	*21-30*	*30+*	*Total*
A. Men (Number)	227	242	284	284	304	1,122	541	270	244	109	3,627
Men (Per cent)	6.3	6.7	7.8	7.8	8.4	31.0	14.9	7.4	6.7	3.0	100.0
Women (Number)	108	135	146	107	118	435	257	145	136	63	1,650
Women (Per cent)	6.5	8.2	8.8	6.5	7.2	26.4	15.6	8.8	8.2	3.8	100.0
	Number of Years' Experience in Teaching Science										
B. Men (Number)	297	355	341	315	326	1,114	462	215	165	59	3,649
Men (Per cent)	8.1	9.7	9.3	8.6	8.9	30.5	12.7	5.9	4.5	1.6	99.8
Women (Number)	210	201	179	131	109	394	209	81	83	28	1,625
Women (Per cent)	12.9	12.4	11.0	8.1	6.7	24.2	12.9	5.0	5.1	1.7	100.0
	Number of Years' Experience in Present Position										
C. Men (Number)	791	586	402	298	258	714	215	83	51	23	3,421
Men (Per cent)	23.1	17.1	11.8	8.7	7.6	20.9	6.3	2.4	1.4	.7	100.0
Women (Number)	354	255	177	135	105	303	107	52	35	16	1,539
Women (Per cent)	23.0	16.5	11.5	8.8	6.8	19.7	7.0	3.4	2.3	1.1	100.1

* The total numbers of teachers reporting these three items do not exactly agree. Thus 22 or .6 per cent more men reported item B than reported item A, while 228 or 6.0 per cent more men reported item B than reported item C; also 25 or 1.5 per cent more women reported item A than reported item B; while 81 or 4.9 per cent more women reported item A than reported item C. These differences, however, distributed as they are through ten groups, seem too small to invalidate comparisons of data for these three related items.

of data from various columns shows that 13.0 per cent of the men and 14.7 per cent of the women had had less than two years of teaching experience, and that 17.8 per cent of the men and 25.3 per cent of the women had taught science less than two years. It will be noted, however, that 32.0 per cent of the men and 36.4 per cent of the women had taught for more than ten years, and teaching other subjects; and that considerably more of the women than of the men were in this group. One or the other or all three of the following reasons may, at least in part, account for these facts: (1) An examination of the complete data in the master table, of which Table VI is an abbreviated summary, reveals the fact that a considerable number of these teachers had had ex-

ence in teaching in the elementary ol. As the old 8-4 organization be- e broken up in many of the school ems represented in this report and 6-6, the 6-3-3, or the 6-5 organiza- took its place, the work in general nce became, for the first time, a part the seventh- and the eighth-grade ram in many of these schools. Con- ently many of the seventh and th grade teachers who remained in same grades under the new organi- n were required to assume the teach- of science as part of the regular k of their grades. All or practically f these teachers were women. Under e circumstances, then, the fact that y more women than men have taken he teaching of science after having more or less experience in teaching r subjects would seem, to some ex- at least, to be due not to a shift n other subjects but to the addition science to their teaching programs. A further inspection of the data es clear that about twice as large a entage of women as of men had transferred to high school work; efore, since a considerable number hese teachers who had not previously ht science were probably women had just been promoted from the les, and since the number of teach- in this study who had had previous erience in teaching *science* in the les is relatively small, a shift from hing in the elementary school to hing in the high school would neces- ly, in a large number of cases, mean hange of subject. (3) A further son suggested by these data and the s just cited is that the men teachers science may have more definitely de- d upon what they intended to teach, that they may have been more for- ate in obtaining, earlier in their teach- careers, assignment to the subject ch they wished to teach.

A comparison of the data in Divisions B and C indicates that while 8.1 per cent of the men and 12.9 per cent of the women were engaged in their first year of science teaching, 23.1 per cent, or nearly three times as large a percentage of men, and 23.0 per cent, or almost twice as large a percentage of women, were teaching for the first year in their present schools. Moreover, by combining data in the first three columns one finds that, although 27.1 per cent of the men and 36.3 per cent of the women had taught science less than three years, 52.0 per cent of the men and 51.0 per cent of the women had been in their present schools for a corresponding period of time. These facts would seem to indicate that the shifting of the teachers from school to school had been even greater than the shifting of teachers from other subjects into science.

A further comparison of the percentages of Divisions B and C for the first five years shows a decreasing spread of differences between corresponding percentages of these teachers as the number of years of experience in teaching science and of tenure in the present schools increased. This fact would seem to indicate that a greatly increasing precentage of the teachers who have taught for several years in the same school have been teaching science during most of those years.

Additional facts bearing upon these items are contributed by the master tables from which Table VI was prepared: A considerable percentage of the teachers of all nine groups of schools had had experience in teaching in the elementary school; not half of these teachers, however, have had experience in teaching elementary science. The maximum number of years of teaching experience in the grades ranged from 5 years for two teachers in Group I to between 21 and 30 years for ten teachers distributed through all but Groups I, II, IV, and IX. The maximum num-

ber of years of experience in teaching science in the grades for the smaller number of teachers who had had such experience, corresponded closely in the various groups with those for total teaching experience.

A considerable number of teachers in every group had had experience in teaching in college, university, or normal schools, or were still engaged in teaching in higher institutions of learning.

It will be seen that the percentages o men and women teachers holding cor responding numbers of degrees ar fairly constant. Most of the teacher (76.2 per cent of the men and 78.3 pe cent of the women) possessed one de gree; most of the remaining teacher (19.4 per cent of the men and 17.1 pe

TABLE VII

NUMBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF SCIENCE HAVING VARIOUS NUMBERS OF ACADEMIC DEGREES

	Number of Degrees						*Total*
	0	*1*	*2*	*3*	*4*	*5*	
Men							
Number	61	2,678	682	74	16	2	3,513
Per cent	1.7	76.2	19.4	2.1	.5	.1	100.0
Women							
Number	48	1,275	278	24	3	0	1,628
Per cent	2.9	78.3	17.1	1.4	.2	.0	99.9

DEGREES

Tables VII, VIII, IX, and X present data upon closely related items of the questionnaire and should therefore be considered together. These tables summarize respectively (VII) the numbers and percentages of the teachers of science who had various specified numbers of academic degrees, (VIII) what these degrees were, (IX) the numbers and percentages of the teachers who were working toward various specified higher degrees, and (X) the facilities of which the teachers are taking advantage in pursuing advanced work.

Table VII is read thus: Of the 3,513 men teachers who reported this item, 61 or 1.7 per cent, and of the 1,628 women teachers, 48 or 2.9 per cent, had no academic degree whatever at the time they submitted these data; 2,678 or 76.2 per cent of the men and 1,275 or 78.3 per cent of the women had one degree, etc. cent of the women) had two degrees Only 2.7 per cent of the men and 1.6 per cent of the women had more than two degrees.

Table VIII is read thus: Of the 3,513 men teachers of science who stated that they possessed degrees (see footnote to Table VIII) 1,820, or 51.8 per cent, had the A. B. degree; and of the 1,628 women teachers, 916, or 56.3 per cent, possessed the A. B. degree, etc. Table IX is read thus: Of 3,513 men, 884 or 25.2 per cent, (see footnote † under Table IX) and of 1,628 women, 314 or 19.2 per cent are studying for the A. M. degree; etc.

Table VIII reveals the fact that the number of men (1,707) who possess the B. S. degree is approximately 94 per cent of the number (1,820) who held the A. B. degree; the number of women (640) possessing the B. S. degree, however, is only about 70 per cent of the number (916) possessing the A. B. degree. The number of the men (207) who had the M. S. degree is about 43 per cent of the number (441) who had

M. A. degree. The number of the
n (84) who held the M. S. de-
is about 47 per cent of the num-
178) who possessed the M. A. de-

e facts in these statements would
to present some proof of the
s that most of the teachers of sci-
who possess either the A. B. or the
degree seek the M. A. rather than
I. S. for their second degrees. Fur-
substantiation of this statement is
H by combining the data in the first

twice as large a percentage of men as of women were thus found who already possess the Ph. D. degree, nevertheless 5.5 per cent of the men and 3.6 per cent of the women were seeking this degree, while respectively .3 and .7 of the men and .3 and .2 per cent of the women, were seeking the D. Sc. and the M. D. degrees. Doubtless the fact that a considerably greater percentage of men than of women possessed or were working toward doctor's degrees is explained by the fact that men have much greater

TABLE VIII

MBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF SCIENCE HAVING CERTAIN ACADEMIC DEGREES

	Degree							
	A.B.	*B.S.*	*Ph.B.*	*B.Ed.*	*M.A.*	*M.S.*	*Ph.D.*	*Misc.*
umber	1,820	1,707	97	79	441	207	22	116
er cent*	51.8	48.6	2.8	2.3	12.3	5.9	.6	3.3
en								
umber	916	640	64	29	178	84	4	38
er cent*	56.3	39.3	3.9	1.8	10.9	5.2	.3	2.3

* These percentages are figured on the basis of the totals of men and women teachers ing one or more degrees as indicated in Table VII, because many of these teachers listed or more of the degrees given in Table VIII.

columns of Table IX, from which it
en that of the 1,416 men and of the
women who were seeking either the
A. or the M. S. degree, 884 or 62.4
cent of the men and 314 or 66.9 per
of the women, respectively, were
ing the M. A. degree.
is interesting to note in Table IX
a considerably larger percentage of
than of women were working
ird higher degrees, despite the fact
vn in Table VIII that a larger per-
age of the men already possessed
nced degrees.
able VIII shows that a negligible
entage of the teachers, only .6 per
of the men and .3 per cent of the
nen, possessed the Ph. D. degree.
le IX reveals the fact that although

possibilities than have women of using these ultimate degrees as stepping stones into university work, industry, or medical practice.

The 116 miscellaneous degrees (Table VIII) included B. L., B. Chem., B. S. E., B. M. T., B. Arch., A. A., B. L., B. Ped., and B. U. One was listed merely as B.

It is somewhat surprising to find among the teachers of science in the schools of the North Central Association even so small a percentage as 1.7 per cent of the men and 2.9 per cent of the women (see Table VII) who possessed no degrees, since "the minimum scholastic attainment of all secondary school teachers of academic subjects shall be equivalent to graduation from a college

belonging to the North Central Association of Colleges and Secondary Schools." [5] These teachers were, however, probably those who had been teaching many years and who remained without degrees because "such requirements shall not be construed as retroactive." [5] Evidence that some of the teachers were working toward their first

made the basis for computation, it found that 47.9 per cent, or nearly h of the men, and 33.3 per cent, or exac a third of the women, were pursui their studies toward advanced degre

Table X shows what facilities for a vanced study were being utilized by t teachers. Thus 1,432 of the men a 478 of the women were studying

TABLE IX

NUMBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF SCIENCE WORKING TOWARD CERTAIN HIGHER DEGREES

	Degree							Total
	M.A.	*M.S.*	*M.Ed.*	*Ph.D.*	*D.Sc.*	*M.D.*	*Misc.*	
Men								
Number*	884	532	23	193	10	24	11	1,677
Per cent†	25.2	15.2	.7	5.5	.3	.7	.3	47.9
Women								
Number*	314	154	7	58	5	4	2	544
Per cent†	19.2	9.5	.4	3.6	.3	.2	.1	33.3

* Several other teachers, probably those who possessed no degrees, listed under this item bachelor's degrees.

† These percentages probably do not exactly represent the facts with respect to this item because, since not all teachers responded to every item on the questionnaire, it is impossible to know whether the teachers who left this item blank did so because they were not working toward advanced degrees or because they overlooked the item. Since, therefore, there are available no totals of men and women to whom this item on the questionnaire applied, the percentages are figured on the basis of the totals in Table VII. It seems certain that the percentages in Table IX which have been figured on this basis are approximately what they would have been had they been computed in terms of the total numbers of men and women teachers who responded to this item either by indicating the degree toward which they were working or by leaving it blank to indicate that they were not seeking an advanced degree.

degrees is found in a number of replies to the item from which Table IX is prepared and to which a number replied that they were working toward the A. B. or the B. S. degree. (See first footnote, Table IX).

It is very interesting and encouraging to note, by combining the data from the last three columns of Table VIII, the large number of the teachers, 18.8 per cent of the men and 16.4 of the women, who possessed advanced degrees. It is gratifying, moreover, to note that when the totals in Tables VII and IX are

summer school, 87 men and 18 wome were pursuing courses by correspond ence, etc. It is not possible to comput the percentages represented by thes numbers, for the reason that no vali basis can be obtained for computin these. Many of these teachers were uti izing, from year to year, more than on of these facilities; for example, a com bination of summer school, correspond ence work, and extension classes. such percentages were figured, on th bases used in computing percentages fo the previous items (for example, th total number of men and women repr sented in these replies) the results wou

[5] Quoted from the requirements of the North Central Association.

isleading, since the number of teach- who were seeking advanced work restricted to those who had not dy secured the highest degree to h they aspire, as doubtless a large ber of these teachers already had.

he extent to which the ambition to e advanced degrees was represented he replies of the teachers is not uately revealed by the 47.9 and the per cent of men and women, re- ively, given in Table IX, for the on that the number of teachers who had had no practice teaching, 130 or 4.9 had had practice teaching; 12 or .5 per cent stated that they had been allowed to substitute teaching experience for practice teaching; 2,044 or 76.6 per cent cited experience which they had had as laboratory assistants in college and which apparently had counted in lieu of practice teaching; and 5 or .2 stated that they had had observation only. The data for the women teachers are read in the same way. Many teachers made no definite response to this

TABLE X

MBERS OF MEN AND WOMEN TEACHERS OF SCIENCE UTILIZING VARIOUS SPECIFIED FACILITIES FOR PURSUING WORK TOWARD ADVANCED DEGREES

	Summer School	*Correspondence*	*Extension*	*Residence*	*Part Time*	*Thesis**
ber						
Men	1,432	87	237	67	57	23
Women	478	18	79	20	3	2

* The meaning of the designation, "Thesis," is not obvious. It is probable that the teachers o wrote "Thesis" in the blank in which they were to indicate by what means other than the ventional ones specified in the questionnaire they were pursuing advanced work, meant that y had completed all the requirements for the degree sought except the thesis or the dissertion, and that they were completing this "in absentia."

advanced work must be restricted hose who have not already secured highest degrees to which they aspire which they are required or influenced administrative ruling or by precedent ting in their schools, to seek.

he popularity of the summer school of the extension school as means securing credits toward advanced rees is evidenced, in so far as these hers are concerned, from the data Table X.

Practice Teaching

Table XI summarizes the replies of teachers to the item covering practeaching. Division A of the table read thus: Of the 2,667 men teach- of science who responded to this n on the questionnaire, 476 or 17.8 item but merely stated "Requirements satisfied." More failed to indicate the subject in which their practice teaching had been done.

An inspection of Table XI reveals the interesting fact that only 4.9 per cent of the men and 10.9 per cent of the women had had practice teaching; therefore, 95.1 per cent of the men and 89.1 per cent of the women had not had practice teaching in the accepted connotation of this term. It is interesting to note, moreover, that slightly more than twice as large a percentage of women had had practice teaching as had the men; these percentages were, respectively, 10.9 and 4.9. A plausible reason to account for the relatively small percentage of the teachers who had had actual practice teaching, may be that the older ones be-

gan their teaching before there was practice teaching as it is now found in colleges and teacher-training institutions.

Probably from the standpoint of those who believe that a considerable amount of practice or "apprentice teaching" is an essential part of the training for teaching, only that small percentage of these teachers, (.5 per cent of the men and .3 per cent of the women), who stated that their previous teaching experience had been accepted in lieu of practice teaching, could be said to have had a type of professional equipment which approximated an acceptable substitute for practice teaching. It is probably logical to infer that most of the small number of teachers who made this reply had taught for a while in the grades or in rural schools, and had then continued their study toward a degree and a certificate. Actual teaching experience under actual classroom conditions, moreover, would of course be generally accepted as of much more value to the individual than the work in practice teaching, which is inevitably more or less artificial and atypical even under the most favorable conditions. Nevertheless there are probably many who would consider even such teaching no

TABLE XI

NUMBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF SCIENCE (A) WHO HAD OR HAD NOT HAD PRACTICE TEACHING, OR SOME SUBSTITUTE FOR PRACTICE TEACHING, AND (B) NUMBERS AND PERCENTAGES WHO HAD AND WHO HAD NOT HAD PRACTICE TEACHING, OR SOME SUBSTITUTE FOR IT, IN THE SCIENCE THEY WERE TEACHING

	No	*Yes*	*Classification*			*Total*
			Teaching Experience Substituted	*Lab. Instruction in College Substituted*	*Observation Only*	
A. Men (Number)	476	130	12	2,044	5	2,667
Men (Per cent)	17.8	4.9	.5	76.6	.2	100.0
Women (Number)	133	133	4	940	3	1,213
Women (Per cent)	10.9	10.9	.3	77.4	.3	99.8

	Classification			*Total*
	In Science Now Teaching	*In Another Science*	*In Another Subject Than Science*	
B. Men (Number)	979	359	618	1,956
Men (Per cent)	50.1	18.3	31.6	100.0
Women (Number)	371	116	487	974
Women (Per cent)	38.1	11.9	50.0	100.0

Those who believe practice teaching to be a necessary part of the preparation of the teacher would vigorously condemn, on several grounds, the practice which, in the case of more than three fourths of the men and women in this group (Table XI), permitted the substitution of experience gained as a lab

ry assistant in college classes for ice teaching. They would do this ing that (1) the methods used in ing college laboratory classes are e those used in laboratory classes e high schools; the number of iden- l elements in the two situations, fore, may not be sufficiently numer- ib insure any considerable degree of fer from the college laboratory to nigh school laboratory class; (2) is unlikely to be much overlapping e subject-matter of the college and igh school courses in science unless ould be between Freshmen college es and high school courses in chem- [7] and (3) laboratory teaching is a part of the teaching work of the school teacher of science and there- practice secured only in laboratory- ling is inadequate preparation for vide variety of instructional activ- in which the prospective science er must subsequently engage.

ose who believe that practice teach- s an essential part of teacher prep- on will be glad, however, to note a negligible percentage of the men women (respectively .2 and .3 per were permitted to substitute mere vation of teaching for actual par- ation in classroom teaching.

vision B of Table XI is read thus: 1,956 men who responded to this on the questionnaire, 979 or 50.1 ent had had their practice teaching whichever one of the substitutes in- ed in Division A had been accepted s equivalent) in the course in sci- which they were teaching at the they responded to the question- ; 359 or 18.3 had had their practice ning in some course in science other the one they were teaching; and 618 or 31.6 had had their practice teaching or its substitute in another subject than science. The data for the women teachers are read similarly.

By combining the data in the first two columns of Division B it will be seen that 68.4 per cent of the men and 50.0 per cent of the women had had their practice teaching in science. Data not included in Table XI reveal the fact that the practice teaching of the remaining 31.6 per cent of the men and of the 50.0 per cent of the women had been secured in a bewildering variety of subjects and subject combinations, many of which have not the remotest connection with science. Thus the 618 men and 487 women did their practice teaching or substitute for it in more than sixty subjects and subject combinations outside the field of science, such, for example, as English, history and Latin, Latin, religious education, civics, commercial geography and mechanics, primary work and commercial subjects, printing, German, grade subjects (31 men and 44 women were in this group), art, art and music, commercial subjects, Dean's work and geometry, art together with history and physical education, German and music, typewriting, bookkeeping, agricultural economics, Latin and psychology, languages and public speaking, commercial law and psychology, and many others.

It is recognized that a teacher of science may have prepared to teach science as a minor and have prepared and expected to teach some other subject as a major; nevertheless, from the standpoint of effective science teaching, the practices illustrated by the facts given above are condemned[8] wherever found in teacher training institutions. It seems unlikely, however, that the fault here lies entirely with the teacher training institutions in which these teachers had

loos, Leonard V., "Overlapping in High l and College," *Journal of Educational rch*, XI (May, 1925), pp. 322-330.

rd, A. W., "High School Physics Makes l Contribution to College Physics," *School Society*, XXXI (April 5, 1930), 468-470.

[8] See *The Thirty-First Yearbook* of the National Society for the Study of Education.

prepared for teaching. Probably most of these teachers of science who had done their practice teaching in subjects far removed from science had neither planned nor prepared to teach science; subsequently they were compelled by exigencies of the administrative situations in their schools, or by other conditions, to include in their teaching one

PROFESSIONAL PREPARATIONS

Table XII presents a summary of th professional training of the teachers c science as indicated by the number c undergraduate, graduate, and total hou in education courses in college. Man failed to respond definitely to this ite but instead wrote "Don't remember," c "Requirement fulfilled." Division A o

TABLE XII

NUMBERS AND PERCENTAGES OF TEACHERS OF SCIENCE HAVING HAD VARIOUS NUMBERS OF (A) UNDERGRADUATE, AND (B) GRADUATE HOURS IN EDUCATION

	Number of Undergraduate Hours								
	0	*1-5*	*6-11*	*12-16*	*17-21*	*22-30*	*31-40*	*41+*	*Total*
A. Men (Number)*	130	106	190	624	881	997	489	169	3,586
Men (Per cent)	3.6	2.9	5.4	17.4	24.6	27.8	13.6	4.7	100.0
Women (Number)*	60	25	65	290	372	480	172	91	1,555
Women (Per cent)	3.9	1.6	4.2	18.7	23.9	30.9	11.1	5.8	100.1

	Number of Graduate Hours								
	0	*1-5*	*6-11*	*12-16*	*17-30*	*31-50*	*51-70*	*71+*	*Total*
B. Men (Number)*	1,694	575	338	278	203	258	144	29	3,519
Men (Per cent)	48.1	16.3	9.6	7.9	5.8	7.3	4.1	.8	99.9
Women (Number)*	940	267	121	64	52	55	22	5	1,526
Women (Per cent)	61.6	17.5	7.9	4.2	3.4	3.6	1.4	.3	99.9

* It will be noted that the total numbers of men and women in Division A disagrees somewhat with those in Division B because not all who gave their numbers of undergraduate hours did likewise with respect to their graduate hours. Inasmuch as the differences are not great (67 or 1.9 per cent for the men and 29 or 1.9 per cent for the women) and are distributed among eight columns, they are insufficient to invalidate the conclusions.

or more courses in science which they taught as best they could.

The fact that 68.4 per cent of the men, as compared with 50.0 per cent of the women, had their practice teaching or its accepted substitute in science would seem to add further weight to the conclusion previously stated, namely, that either the men teachers of science know definitely earlier in their teaching careers (or in their preparation for them), what they will teach or are more fortunate in securing positions to teach the subjects for which they have prepared to teach than do the women.

the table is read thus: Of the 3586 me who responded to this item on the ques tionnaire, 130 or 3.6 per cent had ha no undergraduate work whatever in edu cation, 106 or 2.9 per cent had had fro one to five hours of education in co lege courses, etc.

Division A Table XII shows that th largest percentage of men and women respectively 27.8 and 30.9 per cent, ha had from 22 to 30 undergraduate hour in education. Combining the data i several columns shows that 67.8 per cen of the men and 65.9 per cent of the wo men had had between 12 and 30 under graduate hours of education.

is interesting to note that a consider- larger percentage both of men and omen had had in excess of 30 hours had had fewer than 12 hours; the ective percentages of men and wo- who had had more than 30 hours e 18.3 and 16.9, while those of the and women who had had fewer than ve hours in education were 11.9 and were studying towards the master's degree or who had already earned it.

Only a small percentage of the men and a still smaller percentage of the women had totals in excess of 50 hours of education, though a few individuals gave the astonishing number of more than a hundred hours. On the whole the men had had on the average a somewhat

TABLE XIII

MBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF SCIENCE HAVING VARIOUS NUMBERS OF (A) UNDERGRADUATE AND (B) GRADUATE HOURS IN SCIENCE

	Number of Undergraduate Hours in Science								
	0	*1-10*	*11-20*	*21-30*	*31-40*	*41-60*	*61-100*	*100+*	*Total*
en (Number)	64	57	202	329	489	998	788	333	3,260
en (Per cent)	2.0	1.7	6.2	10.1	15.0	30.6	24.2	10.2	100.0
omen (Number)	16	41	126	199	227	395	212	31	1,247
omen (Per cent)	1.3	3.3	10.1	16.0	18.2	31.7	17.0	2.5	100.1
	Number of Graduate Hours in Science*								
en (Number)		471	256	163	109	82	26	7	1,114
en (Per cent)†		14.4	7.8	5.0	3.4	2.5	.8	.2	34.1
omen (Number)		193	86	74	43	31	17	5	449
omen (Per cent)†		15.5	6.9	5.9	3.4	2.5	1.4	.4	36.0

* It is assumed here and also in Table XIV, that little significance would be attached to numbers and percentages of men and women who definitely stated that they had no graduhours, since only a few so stated; while only approximately a third of the men and women reported undergraduate training made any statement concerning their graduate hours.

† These percentages are computed on the basis of all teachers of science reporting upon item. Thus, 471 men reporting from one to ten graduate hours in science constitute 14.4 cent of the 3,260 men teachers of science reporting.

Data not included in this table re- the fact that in general the larger ize of school the greater was the ge number of undergraduate hours ducation per teacher of science.

vision B of Table XII shows that or 48.1 per cent of the men and r 61.6 per cent of the women teachf science had no graduate credits in tion. Combining the data in several ns, moreover, indicates that 87.7 cent of the men and 94.6 per cent e women had fewer than 31 graduours in education. Doubtless this was made up chiefly of those who larger number of graduate hours than the women. As with the undergraduate hours, data not included in Division B show that the average number of graduate hours per teacher tended to increase in general with the size of school.

SUBJECT-MATTER PREPARATION OF ALL TEACHERS OF SCIENCE

Table XIII presents the data showing the undergraduate and the graduate training in the subject-matter of science which the teachers possessed. The table is read thus: Of the 3260 men and 1247 women who submitted data on this item

TABLE XIV

NUMBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF SCIENCE HAVING VARIOUS NUMBERS OF UNDERGRADUATE AND GRADUATE HOURS OF SUBJECT-MATTER TRAINING IN (A) BIOLOGY, (B) CHEMISTRY AND (C) PHYSICS

	Undergraduate Hours							
	0	*1-5*	*6-10*	*11-20*	*21-30*	*31-40*	*40+*	*Total*
A. Biology								
Men (Number)	27	33	134	228	194	128	132	876
Men (Per cent)	3.1	3.8	15.3	26.0	22.1	14.6	15.1	100.0
Women (Number)	7	13	57	129	125	108	123	562
Women (Per cent)	1.2	2.1	10.2	23.1	22.1	19.2	22.0	99.9
	*Graduate Hours**							
Men (Number)		45	40	38	20	17	16	176
Men (Per cent)†		5.1	4.6	4.3	2.3	1.9	1.8	20.0
Women (Number)		60	32	43	33	16	16	200
Women (Per cent)†		10.7	5.7	7.7	5.9	2.8	2.8	35.6
	Undergraduate Hours							
B. Chemistry								
Men (Number)	5	16	128	373	373	221	103	1,219
Men (Per cent)	.4	1.3	10.5	30.6	30.6	118.1	8.4	99.9
Women (Number)	1	5	36	66	53	39	18	218
Women (Per cent)	.5	2.3	16.5	30.3	24.3	17.8	8.2	99.9
	*Graduate Hours**							
Men (Number)		117	110	100	48	37	21	433
Men (Per cent)†		9.6	9.0	8.2	3.9	3.0	1.7	35.4
Women (Number)		20	26	14	10	3	4	77
Women (Per cent)†		9.2	11.9	6.4	4.6	1.4	1.8	35.3
	Undergraduate Hours							
C. Physics								
Men (Number)	62	73	544	443	143	66	15	1,346
Men (Per cent)	4.7	5.4	40.4	32.9	10.6	4.9	1.1	100.0
Women (Number)	10	12	75	47	11	3	1	159
Women (Per cent)	6.3	7.5	47.2	29.5	7.0	1.9	.6	100.0
	*Graduate Hours**							
Men (Number)		125	82	51	20	10	7	295
Men (Per cent)†		9.3	6.2	3.8	1.5	.7	.5	22.0
Women (Number)		12	12	5	1	0	0	30
Women (Per cent)†		7.6	7.6	3.1	.6	.0	.0	18.9

* See footnote * under Table XIII.

† These percentages are computed on the basis of all teachers reporting hours in the respective subjects. Thus, 45 men reporting that they had had between one and five graduate hours in biological science are 5.1 per cent of the 876 men teachers of biology.

or 2.0 per cent and 16 or 1.3 per cent, pectively, reported that they were hing classes in science when they had no previous preparation in the sub-matter of any branch of science;

he modal number of hours' training undergraduate work in science, as e data are arbitrarily arranged in le XIII, was between forty-one and y hours for 31.6 per cent of the men 31.7 per cent of the women; in grad- e work in science the modal number ours was between one and ten hours 14.4 per cent of the men and 15.5 cent of the women.

combination of the data in several mns of the table reveals the fact that per cent of the men and 69.4 per of the women had had more than ty undergraduate hours of prepara- in the subject-matter of science; eover, 34.1 per cent of the men and per cent of the women had had more ess of graduate work in some branch branches of science.

Subject-Matter Preparation of Teachers of Biology, Chemistry and Physics

able XIV is concerned with the sub-matter preparation of teachers of ogy chemistry and physics. Division f Table XIV is read thus: Of 876 teachers of biology who reported item on the questionnaire, 27 or 3.1 cent had had no undergraduate hours reparation whatever[9] in the biological nces, and of the 562 women, 7 or 1.2 cent had had no subject-matter prep- ion whatever in the subject; etc. isions B and C present similar data the teachers, respectively, of chemis- and physics. Because of space limi- ns Table XIV is confined wholly to subject-matter preparation of teachers of biology, chemistry and physics.

It will be noted from a combination of the data from several columns of Division A, that 22.2 per cent of the men and 13.5 per cent of the women had had fewer than eleven hours of undergraduate hours of subject-matter preparation in biological science (see footnote* Table XVI). The modal number of hours of undergraduate training in biological science, as these data are arbitrarily arranged in Table XIV, was found to be between eleven and twenty hours for 26.0 per cent of the men and for 23.1 per cent of the women. The table shows that, on the whole, the women teachers of biology had had more undergraduate hours of subject-matter preparation than the men; the opposite was true with respect to the men and women teachers of chemistry and physics. The modal number of undergraduate hours for teachers of chemistry (Division B) was either between eleven and twenty hours or between twenty-one and thirty hours for the men, since an equal number of men is found in each of these columns, and between eleven and twenty hours for the women; for the teachers of physics the modal number of undergraduate hours was between six and ten hours both for the men and for the women.

The modal number of graduate hours in biology for both the men and the women was between one and five hours; in chemistry, between one and five for the men and between six and ten for the women; and in physics, between one and five for the men and either between one and five or between six and ten for the women.

Of the teachers who reported this item, those who were teaching physics were, on the whole, less well trained in subject-matter than those who were teaching either biology or chemistry, since 50.5 per cent of the men and 61.1 per cent of the women teachers of physics reported

[9] It is here assumed that a teacher had had subject-matter training whatever in a given branch of science when the teacher reported undergraduate hours in that branch.

fewer than eleven undergraduate hours of subject-matter, while 22.2 per cent of the men and 13.5 per cent of the women teachers of biology, and 12.2 per cent of the men and 19.3 per cent of the women teachers of chemistry reported fewer than eleven undergraduate hours of subject-matter. It will be noted also that a larger percentage of men and women teachers of biology and chemistry than of physics had had more than twenty hours of undergraduate and of graduate hours of subject-matter.

Data not included in Table XIII show that a larger percentage of the teachers of agriculture had had no preparation in the subject-matter of that subject than of the teachers of biology, physics and chemistry in the subject-matter of these respective subjects; but on the other hand a considerably larger percentage of teachers of agriculture than of biology, physics and chemistry had had extensive preparation (that is more than forty hours of undergraduate and graduate work combined), in the subject-matter of the course they were teaching. An overwhelming majority of the teachers of hygiene either reported that they had had no subject-matter preparation whatever in this subject or had had practically none, that is, less than six hours. The same generalization holds for the teachers of physiology. The teachers of botany and zoölogy were on the whole about as well grounded in subject-matter as were the teachers of biology; in the schools of the smaller groups the botany teachers were in general somewhat better trained than the zoölogy teachers. On the whole the subject-matter training of the teachers of physiography appeared from these data to be less adequate than the subject-matter training of the teachers of any other branch of science taught in secondary schools of the North Central Association, since nearly all of these physiography teachers reported that they had had no subject-matter training whatever in the subject, and most of the res reported that they had had only betwee six and ten hours. The case of thes teachers with respect to subject-matte preparation, however, would probably b improved if contributory courses in geog raphy, geology and portions of physic and chemistry were considered as train ing for teachers of physiography.

A consideration of the data of Table XIII and XIV together gives evidenc of the practice of assigning to a teache who has had some preparation in one o more branches of science, some othe branch or branches for which he ha no training. Such practice deserves th severest condemnation. A partial cur for this evil can be effected by th teacher training institutions if they wil insure that the teachers of science whon they certificate have some training, a much as possible, in both the physica and the biological sciences—that is, a least some work in physics, chemistry botany and zoölogy, which has been care fully planned to serve as backgroun training for all prospective teachers o science. The responsibility for the res of the cure lies with the administrator who must make sure that the teachers o science whom they engage have a mor or less well-rounded training in science and who must also make every effort t assign the classes in science to suc teachers only. It must be recognized however, that it is not always adminis tratively possible to make such assign ments in the smaller schools. It is im possible, however, to condone *on an grounds* such conditions as are illus trated by one extreme case, namely, tha of a teacher essaying to teach four dif ferent branches of science with no sub ject-matter preparation whatever in an branch.

From the standpoint vigorously ex pressed and militantly defended by lead ers in the field of the teaching of scienc to the effect that the fundamental re

rement for successful teaching of sci- is an adequate grounding in subject- ter, the data contained in Tables XIII XIV are disappointing. Far too many the teachers of science were insuffi- tly trained in the subject-matter of courses they are attempting to teach. probable, moreover, that the teachers proximately nine hundred in number) did not supply data on this item are the whole less adequately prepared those who reported, though this

Most of these men and women teachers had had more or less subject-matter training in four or more branches of science; the modal number for the men was 5 and for the women was 4 branches. On the whole the men teachers of this subject had a somewhat more widely differentiated training in the subject-matter of science than the women.

These data would seem to indicate that these teachers of general science had had fairly extensive, though not necessarily

TABLE XV

UMBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF GENERAL SCIENCE HAVING SUBJECT-MATTER TRAINING IN VARIOUS NUMBERS OF DIFFERENT BRANCHES OF SCIENCE

	*Number of Different Branches of Science**									
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9+*	*Total*
(Number).....	33	97	155	169	188	148	94	66	74	1,024
(Per cent)....	3.2	9.5	15.1	16.5	18.3	14.5	9.2	6.4	7.2	99.9
nen (Number)	10	38	54	94	85	80	43	23	14	441
nen (Per cent)	2.3	8.6	12.2	21.3	19.3	18.1	9.8	5.2	3.2	100.0

* These branches of science include all of those mentioned in footnote * under Table XVI.

mise cannot be verified. An encouraging aspect revealed by these data, however, is that a considerable percentage of teachers of each subject had graduate credits in science. Data not included these tables show that in general the hers in the larger schools were far ter trained than those in the smaller s.

SUBJECT-MATTER PREPARATION OF TEACHERS OF GENERAL SCIENCE

ables XV and XVI present a brief mary of the subject-matter training he teachers of general science. Table is read thus: Of 1,024 men teachers general science who reported their ject-matter training in science, 33 or per cent, and of the women teachers or 2.3 per cent, had had subject- tter training in only one branch of ence; etc.

intensive, training in the subject-matter of science. It must be remembered, however, that closely allied courses such, for example, as hygiene, sanitation and bacteriology, were listed by many teachers as separate branches of science and could not conveniently be considered otherwise in preparing these tabulations. A consideration of the data in the following table, moreover, reveals the fact that the subject-matter training of a considerable percentage of these teachers was inadequate since it was too highly specialized and was not sufficiently well distributed among the branches of science included in the course material of general science.

In Table XVI, the teachers of general science are considered with respect to their training in the subject-matter of (A) the biological sciences and (B) the physical sciences. The table is read thus: Of 1,056 men teachers and 451 women

teachers of general science who reported upon this item, 116 or 10.9 per cent of the men and 20 or 4.4 per cent of the women reported that they had had no

teachers of general science was mc adequate than the biological backgrou since 50.7 per cent of the men and wom had had more than twenty hours of u

TABLE XVI

NUMBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF GENERAL SCIENCE HAVIN HAD VARIOUS NUMBERS OF UNDERGRADUATE AND GRADUATE HOURS IN (A) THE BIOLOGICAL AND (B) THE PHYSICAL SCIENCES

	Undergraduate Hours							
	0	*1-5*	*6-10*	*11-20*	*21-30*	*31-40*	*40+*	*Total*
A. In Biological Science*								
Men (Number)	116	119	183	243	124	95	176	1,056
Men (Per cent)	10.9	11.2	17.3	23.1	11.7	9.0	16.7	99.9
Women (Number)	20	31	63	127	75	65	70	451
Women (Per cent)	4.4	6.9	14.0	28.2	16.7	14.4	15.5	100.1
	Graduate Hours							
Men (Number)	113	42	38	19	14	12	10	248
Men (Per cent)	45.6	16.9	15.3	7.7	5.6	4.8	4.0	99.9
Women (Number)	20	38	20	13	11	7	7	116
Women (Per cent)	17.2	32.8	17.2	11.2	9.5	6.0	6.0	99.9
	Undergraduate Hours							
B. In Physical Science*								
Men (Number)	26	43	88	204	283	195	213	1,052
Men (Per cent)	2.4	4.1	8.4	19.4	26.9	18.6	20.2	100.0
Women (Number)	20	37	84	154	80	47	37	459
Women (Per cent)	4.4	8.1	18.3	33.5	17.4	10.2	8.1	100.0
	Graduate Hours							
Men (Number)	28	76	81	49	29	21	8	292
Men (Per cent)	9.6	26.0	27.7	16.7	10.0	7.2	2.7	99.9
Women (Number)	21	25	14	11	5	2	2	80
Women (Per cent)	26.2	31.3	17.4	13.8	6.3	2.5	2.5	100.0

* In this study "biological science" includes agriculture, bacteriology, botany, biology, horticulture, hygiene, physiology, sanitation, and zoölogy; physical science includes astronomy, chemistry, geology, physiography, and physics.

subject-matter preparation in the biological sciences; 119 or 11.2 per cent of the men and 31 or 6.9 per cent of the women stated that they had had from one to five hours of undergraduate work in the biological sciences; etc.

A combination of the data in several columns of the table shows that on the whole the physical background of the

dergraduate training in the physical sc ences while only 42.0 per cent had ha more than twenty hours of undergradua training in the biological sciences. Mor over, 82.1 of the men and women ha had more or less of graduate work i the physical sciences, while only 68 per cent had had more or less of gradua training in the biological sciences.

A combination of the data in the first three columns of Table XVI reveals the fact that 39.4 per cent of the men teachers of general science and 25.3 per cent of the women teachers had had fewer than eleven hours of undergraduate training in the biological sciences; and that 14.9 per cent of the men and 30.8 per cent of the women had had fewer than eleven hours of undergraduate training in the physical sciences. It will be noted also in Column 1, that 116 or 10.9 per cent of the men and 20 or 4.4 per cent of the women had had no subject-matter preparation in the biological sciences, while 26 or 2.4 per cent of the men and 20 or 4.4 per cent of the women had had no subject-matter training whatever in the physical sciences. All of these facts together show that on the whole the men were better prepared in physical sciences than the women and that the women were better prepared in the biological sciences than the men.

Since adequate training for teaching general science includes a grounding in both the physical and the biological sciences, it is obvious from Table XVI, as was pointed out in the discussion of Table XV, that a considerable percentage of the teachers of general science were inadequately prepared in this respect. On the other hand, both Tables XV and XVI show that a large percentage of both the men and women teachers of general science not only had had more or less of subject-matter training in each of several branches of science but had had also a considerable number of hours in science; moreover a large percentage of the teachers had had more or less graduate credit in science. Data not included in these tables indicate that on the whole the general science teachers of the larger schools were much better trained both extensively and intensively in the subject-matter of science than those in the smaller schools.

Teaching Load of Teachers of Science

Table XVII reveals the number of teaching periods per week which the programs of the teachers of the four major branches included. The table is read thus: Of 886 men teachers of biology 23 or 2.6 per cent, taught between eleven and fifteen periods per week, 108 or 12.2 per cent, taught between sixteen and twenty periods per week; etc.

As these data are arbitrarily grouped, the modal number of teaching periods per week for both men and women teachers of biology, chemistry and physics is from twenty-six to thirty periods; and for men teachers of general science between twenty-one and twenty-five periods; for the women teachers of general science, between these numbers or between twenty-six and thirty periods. It will be noted from a combination of data in the third and fourth columns, that nearly three fourths of the teachers had teaching schedules which included between twenty and thirty periods per week. A considerable and fairly uniform percentage of men and women teachers of these four branches of science taught from thirty-one to thirty-five periods per week, while a small percentage of them taught more than thirty-six periods per week. Data not included in this table reveal the fact that three teachers of agriculture taught between forty-six and fifty periods per week.

There are no significant differences in the number of periods taught per week by teachers of these four major subjects; but such differences as might exist in the cases of those who taught only science are probably obscured by the programs of those who taught science along with other subjects.

The complete data reveal no tendencies toward relatively lighter or heavier programs in the larger or smaller schools. There are, moreover, no evident tendencies of variation in teaching load be-

tween the teachers of the four major branches (Table XVII) and the teachers of the minor branches of science.

TEACHING COMBINATIONS

It is impossible within the space limitations of this report to summarize in tabular form the various combinations of subjects revealed by the teaching programs submitted. As was the case with the department heads discussed in connection with Table V, each branch of science was found in teaching combination with almost every other subject; apparently no subject in the entire program of studies of the high school was too far removed from science to be combined more or less frequently with science. In general, but only to a somewhat limited extent, this condition w found to improve with the size school; that is, in the larger schc there was evident a tendency for tea ing programs both to include fewer s jects and to combine with science fe subjects having a remote connection none whatever with science.

TABLE XVII

NUMBERS AND PERCENTAGES OF MEN AND WOMEN TEACHERS OF THE FOUR MAJOR BRANCHES OF SCIENCE TEACHING VARIOUS NUMBERS OF PERIODS PER WEEK*

	No. Periods Per Week							
	11-15	*16-20*	*21-25*	*26-30*	*31-35*	*36-40*	*40+*	*Tot*
Biology								
Men (Number)	23	108	298	349	88	20	0	886
Men (Per cent)	2.6	12.2	33.7	39.4	9.9	2.2	.0	10
Women (Number)	10	75	216	241	51	7	0	60
Women (Per cent)	1.7	12.5	36.0	40.2	8.5	1.0	.0	10
Chemistry								
Men (Number)	38	149	414	436	111	21	1	1,17
Men (Per cent)	3.2	12.7	35.4	37.3	9.5	1.8	.1	10
Women (Number)	5	26	76	79	23	1	0	21
Women (Per cent)	2.4	12.4	36.2	37.6	10.9	.5	.0	10
General Science								
Men (Number)	36	151	388	344	86	12	1	1,01
Men (Per cent)	3.5	14.8	38.1	33.8	8.4	1.2	.1	9
Women (Number)	13	55	191	191	57	5	0	51
Women (Per cent)	2.5	10.7	37.3	37.3	11.2	.9	.0	9
Physics								
Men (Number)	53	194	447	498	117	19	2	1,33
Men (Per cent)	4.0	14.6	33.6	37.4	8.8	1.4	.2	10
Women (Number)	3	20	59	63	19	3	0	16
Women (Per cent)	1.8	11.9	35.3	37.7	11.4	1.8	.0	9

* These teaching programs include all the subjects taught by these teachers.

The data in Tables XVII, XVIII, and XIX were taken from the same teachers' pro grams. The negligible differences in total numbers of teachers for each subject in the thre tables are due to slight errors in the tabulating.

PERIODS PER WEEK DEVOTED TO SCIEN

Table XVIII shows the numbers periods per week devoted to each of t four major sciences: biology, chemist general science, and physics. The tal is read thus: In the 1,475 teachers' p grams from which the data concerni biology are taken, 10 programs or .7 p cent provided four periods per wee 729 or 49.4 per cent provided five pe

ls per week; 18, or 1.2 per cent pro-ded six periods per week; etc.

It will be noted that although there as considerable variation in the num-r of periods per week provided for ese four branches of science, either ve or seven periods per week were used the majority of schools represented the teachers' programs. Chemistry

Data not included in this table reveal the fact that agriculture was offered in most of the schools five times per week; in a somewhat smaller percentage of schools, ten times per week; and in a still smaller percentage, seven times per week. Botany and zoölogy were assigned seven periods per week somewhat more frequently than five; this variation

TABLE XVIII

NUMBERS AND PERCENTAGES OF TEACHERS' PROGRAMS IN WHICH VARIOUS NUMBERS OF PERIODS PER WEEK WERE DEVOTED TO EACH OF THE FOUR MAJOR BRANCHES OF SCIENCE

	Number of Periods Per Week								
	3	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*Total*
ology									
Number	0	10	729	18	668	3	4	43	1,475
Per cent	.0	.7	49.4	1.2	45.3	.2	.3	2.9	100.0
emistry									
Number	0	6	505	12	781	7	1	59	1,371
Per cent	.0	.4	36.9	.9	57.0	.5	.1	4.2	100.0
neral Science									
Number	22	18	1,132	9	329	4	1	14	1,529
Per cent	1.4	1.2	74.0	.6	21.5	.3	.1	.9	100.0
hysics									
Number	1	5	529	25	892	6	9	47*	1,514
Per cent	.1	.3	34.9	1.7	58.9	.4	.6	3.1	100.0

* In two schools 11 periods per week were devoted to physics.

d physics were offered seven periods r week in, respectively, 57.0 and 58.9 r cent of the schools, while these same ubjects were offered five times per eek in, respectively, 36.9 and 34.9 per nt of the schools. This situation is versed in the cases of biology and gen-al science, for which there was a pro-sion for five periods per week in, re-pectively, 49.4 and 74.0 per cent of the hools, and for seven periods per week , respectively, 45.3 and 21.5 per cent. is interesting to note that these four ubjects were offered fewer than five mes per week each in less than 1.0 per nt of the schools and that biology, hysics, and chemistry were offered ten mes per week in, respectively, 2.9, 4.2, nd 3.1 per cent of the schools.

from the practice noted with respect to biology may be due to the fact that elementary biology, which was offered in a considerable number of the schools, is not a "laboratory" course but in treatment is more like general science than like the more advanced subject-matter courses. Geology, hygiene, physiology, and physiography were offered five times per week in a large majority of the schools in which these subjects were taught.

NUMBER OF PERIODS DEVOTED TO LABORATORY WORK

Table XIX presents the various administrative plans for providing laboratory work in the four major branches of science. The table is read thus: In the

programs of 1,483 teachers of biology, 576 or 38.8 per cent reported that no periods were set aside for laboratory work exclusively; that is, in these programs laboratory work was not definitely scheduled for certain days; in 29 or 2.0 per cent of the programs laboratory work was scheduled for one single period per week, etc.

in favor with teachers of all branch of science because it is less likely tha is the seven-period program to be fo malized by having a clearcut division "recitation" and "laboratory work" tha is the seven-period program.

It will be noted that many schoo were administered so that two doub periods per week were devoted to lab

TABLE XIX

NUMBERS AND PERCENTAGES OF TEACHERS' PROGRAMS IN WHICH WERE FOUND VARIOUS ADMINISTRATIVE PLANS FOR PROVIDING LABORATORY WORK IN EACH OF THE FOUR MAJOR BRANCHES OF SCIENCE

	Plan							
	No Lab.	*Single Periods*			*Double Periods*		*Misc.*	*Total*
		1	*2*	*5*	*1*	*2*		
Biology								
Number	576	29	134	24	14	693	13	1,483
Per cent	38.8	2.0	9.0	1.6	.9	46.6	.9	99.8
Chemistry								
Number	301	19	184	31	14	809	22	1,380
Per cent	21.8	1.4	13.3	2.3	1.0	58.6	1.6	100.0
General Science								
Number	1,092	18	45	12	6	339	9	1,521
Per cent	71.8	1.2	2.9	.8	.4	2.2	.6	99.9
Physics								
Number	332	17	199	29	33	881	13	1,504
Per cent	22.1	1.1	13.2	1.9	2.2	58.6	.9	100.0

It will be noted that no definite periods were scheduled for laboratory work in 71.8 per cent of the programs of teachers of general science, in 38.8 per cent of those of teachers in biology, in 22.1 per cent of those of the teachers of physics, and in 21.8 per cent of the programs of teachers of chemistry. It must not be inferred from this statement, however, that no laboratory work was given in these courses; Table XXII shows that the percentage of such courses is relatively small. The data in Table XIX must be interpreted to mean that in these programs such laboratory work as was included was given whenever it best fitted with the development of the work; such a program is in line with progressive practice and is gaining

oratory work in all of the major scienc subjects. This is generally true, wit the exception of general science whic was represented by only 2.2 per cent the schools. The provision for tw double laboratory periods, moreove was far more frequently found in th cases of chemistry and physics than i the case of biology.

The miscellaneous programs include three or four single laboratory periods i a few schools and in sporadic instance one or two triple periods; in one schoo the laboratory work in physics was ca ried on in six single laboratory period while in another it was conducted in on laboratory period four class periods long

Data not included in Table XIX sho that less than 25 per cent of the schoo

ering agriculture allowed two double iods per week for laboratory work; rest had "no laboratory" or "five gle periods." For botany and zoölogy, majority of schools provided two ible periods per week; most of the offered "no laboratory," with a still aller number offering "two single iods." Geology and hygiene were nd to be almost wholly "no labora- y" subjects. About 15 per cent of the ools offered two double laboratory iods for physiology; the rest offered laboratory." About 16 per cent of schools provided two double labora- y periods for physiography; the rest vided "no laboratory."

Pupil Enrollments in Various Branches of Science

Table XX indicates the total enroll- nts of boys and girls in the various nches of science reported (see foot- e* under Table XX). The table is d thus: Agriculture was reported to e a total enrollment of 8,755 boys and 14 girls; botany, a total enrollment of 53 boys and 7,800 girls; etc.

A comparison of the enrollments in rsics and chemistry and in botany and logy would not be justified, for the son given in the discussion of botany and zoölogy, of chemistry and physics in connection with Table II, namely, that in the smaller schools these pairs of subjects are given in alternate semesters.

These figures indicate that, to some extent, agriculture, chemistry, geology, physics, physiography, and zoölogy were more popular with the boys; and that botany, biology, general science, hygiene and physiology were more popular with the girls. These deductions are true, provided the numbers of boys and girls to whom these courses were open were approximately equal in numbers. It is interesting to note that the enrollment in biology was about four times the enrollment in botany and zoölogy combined, and that the largest enrollment in all these subjects was in general science. About the same numbers of boys were enrolled in each of the three subjects, biology, chemistry and physics, but there were nearly twice as many girls who were studying biology as there were who were studying chemistry, and more than three times as many who were studying biology as were studying physics.

TABLE XX

NUMBERS OF BOYS AND GIRLS ENROLLED IN VARIOUS BRANCHES OF SCIENCE*

	Branch†					
	Agric.	*Botany*	*Biology*	*Chemistry*	*General Science*	
s	8,755	4,653	37,622	38,225	43,245	
s	1,914	7,800	44,283	25,697	47,494	
	Geol.	*Hygiene*	*Physics*	*Physiog.*	*Physiol.*	*Zoölogy*
s	568	1,098	39,644	2,293	4,375	5,082
s	366	1,489	14,130	1,769	5,082	3,640

* These totals are compiled from the class enrollments as reported on the questionnaire the teachers, and are valuable chiefly for purposes of comparison since they are not mplete for the reason that not all of the teachers gave their class enrollments.

† Miscellaneous subjects having only local or very small total enrollments are not cluded.

Size of Science Classes

Table XXI shows the size of classes in the four major branches of science. The table is read thus: Of 3,260 classes

in biology reported in the teachers' programs, 14 or .4 per cent had enrollments of from one to five pupils, 47 or 1.4 per cent had enrollments of from six to ten pupils, 169 or 5.2 per cent had enrollments of from eleven to fifteen pupils, etc.

As these data are arbitrarily grouped in this table the modal class in biology and in general science had an enrollment of between twenty-six and thirty pupils; in chemistry and physics an enrollment of between twenty-one and twenty-five pupils. More than one quarter (26.6 per cent) of these classes in general science and about one-sixth (16.8 per cent) of the biology classes had between thirty-one and forty pupils enrolled.

In general, as would be expected, the size of class tended to increase with the size of the school, not only in the major but also in the minor branches of science. Classes numbering more than fifty pupils were reported in the groups of larger schools. The largest class reported, one in general science taught by a woman in a Chicago school of Group VI, had sixty-two pupils enrolled.

Class size in the minor branches of science was found in the main to correspond closely with that of the major branches shown in Table XXI.

TABLE XXI

NUMBERS AND PERCENTAGES OF CLASSES IN THE FOUR MAJOR BRANCHES OF SCIENCE HAVING CERTAIN PUPIL ENROLLMENTS

Classes in	*Number of Pupils Enrolled*								
	1-5	*6-10*	*11-15*	*16-20*	*21-25*	*26-30*	*31-40*	*41+*	*Total*
Biology									
Number	14	47	169	486	917	1,048	547	32	3,260
Per cent	.4	1.4	5.2	14.9	28.1	32.1	16.8	1.0	99.9
Chemistry									
Number	14	134	422	709	939	620	319	7	3,164
Per cent	.4	4.2	13.3	22.4	29.7	19.6	10.1	.2	99.9
General Science									
Number	4	38	147	440	709	898	843	97	3,176
Per cent	.1	1.2	4.6	13.9	22.3	28.3	26.6	3.0	100.0
Physics									
Number	26	193	363	592	608	455	292	7	2,536
Per cent	1.0	7.6	14.3	23.4	23.9	17.9	11.5	.3	99.9

THE INDIVIDUAL OR THE DEMONSTRATION PLAN OF LABORATORY WORK

Table XXII shows the numbers and percentages of teachers who reported that they used the individual and the demonstration plans, or various combinations of these plans of conducting laboratory work. The table is read thus: Of 1,611 teachers of biology who responded to this item of the questionnaire 40 or 2.5 per cent had no laboratory exercises performed in connection with the course; 572 or 35.5 per cent used the individual plan of pupil experimentation exclusively; 85 or 5.2 per cent demonstrated all the laboratory exercises themselves; 308 or 19.1 demonstrated some of the exercises and allowed the pupils to demonstrate all the rest; 598 or 37.1 used a combination of individual pupil experimentation and demonstrations by the teacher and the pupils; and 8 or .5 per cent used different ones of these plans with different semesters' work in the same subject.

will be noted that the laboratory tices varied somewhat with these r major subjects: With biology and eral science the modal number of hers used a combinaton of individual il experimentation with teacher and (Columns *B* and *E* combined), while 85.7 per cent of the teachers used some form or other of the demonstration plan (Columns *C*, *D*, and *E*, combined). Some teachers of each of the branches of science gave courses without any lab-

TABLE XXII

UMBERS AND PERCENTAGES OF TEACHERS OF THE FOUR MAJOR BRANCHES OF SCIENCE USING THE INDIVIDUAL AND THE DEMONSTRATION PLANS OF LABORATORY WORK

	*Plan**						
	A	*B*	*C*	*D*	*E*	*Misc.*†	*Total*‡
pgy							
Number	40	572	85	308	598	8	1,611
Per cent	2.5	35.5	5.2	19.1	37.2	.5	100.0
mistry							
Number	20	929	30	115	450	3	1,547
Per cent	1.3	60.1	1.9	7.4	29.1	.2	100.0
ral Science							
Number	109	149	493	460	630	5	1,846
Per cent	5.9	8.1	26.7	24.9	34.1	.3	100.0
sics							
Number	18	920	32	181	443	3	1,597
Per cent	1.1	57.6	2.1	11.3	27.7	.2	100.0

* The teachers supplied these data in response to the following directions: "Please write e name of each science course you are teaching this semester. Write *A* in the parentheses ter it, if *no* laboratory experiments are performed in connection with the course; write *B* laboratory work is a part of the course and if also the pupils themselves perform *all* of ese laboratory experiments; write *C* if you, yourself, demonstrate *all* of these experiments; ite *D* if you demonstrate some and allow pupils to demonstrate all the rest; write *E* if the pils themselves perform certain of the experiments and you or the pupils demonstrate ers to the group."

† Some teachers wrote combinations, as *AC*, to indicate, probably, that they used different ocedures in different semesters' work in the same subject.

‡ It will be noted that a larger number of teachers responded to this and some of the er items of the questionnaire than to those immediately preceding.

il demonstration; with chemistry and sics a majority of the teachers used ividual pupil experimentation ex-sively. With biology, individual lab-tory experimentation by pupils was d exclusively by almost as many chers as used the combination plan of ividual experimentation and demon-ation. While individual pupil experi-ntation was used exclusively by rela-ely few (8.1 per cent) of the teachers general science, 42.2 per cent used the ividual plan more or less frequently oratory work whatever (Column *A*); the smallest percentage was found among teachers of physics (1.1); the largest among teachers of general science (5.9). Exclusive teacher demonstration was used by a relatively small percentage of teachers, except those of general science (Column *C*).

Data not included in Table XXII show that most of the teachers of botany used the individual method, though nearly as large a percentage used a combination of individual pupil experimentation with

teacher and pupil demonstration. About 70 per cent of the teachers of zoölogy used the individual method. About equal numbers of the teachers of agriculture used each of the plans *B*, *D*, and *E* (see footnote* Table XXII). Most of the teachers of hygiene and physiology used no laboratory experimentation whatever; the rest used largely some form or other of the demonstration method or a combination of it with the individual plan. More teachers of physiography used no laboratory experimentation whatever than used any other of these plans; the rest in about equal numbers used plans *B*, *D*, and *E*.

table is read thus: Of 1,310 teachers c biology who responded to this item, 98 or 75.0 per cent used the even-front pla of administrating laboratory work; 29 or 22.1 per cent used the rotation plan while 38 or 2.9 used a combination c both plans.

TABLE XXIII

NUMBERS AND PERCENTAGES OF TEACHERS OF THE FOUR MAJOR BRANCHES OF SCIENCE USING THE "EVEN-FRONT" AND THE "ROTATION" PLANS OF LABORATORY WORK

	*Plan**			
	A	*B*	*AB*	*Total*
Biology				
Number	982	290	38	1,310
Per cent	75.0	22.1	2.9	100.0
Chemistry				
Number	937	524	30	1,491
Per cent	63.9	35.1	2.0	100.0
General Science				
Number	579	233	11	823
Per cent	70.4	28.3	1.3	100.0
Physics				
Number	501	922	30	1,453
Per cent	34.5	63.4	2.1	100.0

*The teachers supplied these data in response to the following directions: "Please write the name of each course you are teaching this semester, with which pupils perform some or all of the laboratory experiments themselves. Write *A* in the parentheses if the pupils perform the same experiment at the same time, that is, if the "even front" method in individual laboratory experimentation is used; write *B* in the parentheses if different pupils work upon different experiments during the same period."

EVEN-FRONT AND ROTATION PLANS OF LABORATORY WORK

Table XXIII is a further study of the practices indicated in columns B and E of Table XXII. It shows the relative use of the even-front and the rotation plans of individual laboratory work. The

It will be noted that the even-fron plan was used by a large majority of th teachers of biology, chemistry and gen eral science, but that the rotation pla was used by a large majority of th teachers of physics.

Data not included in this table revea the fact that the teachers of all the othe courses in science used the even-fron method more than they used the rotatio plan.

RELATIVE PROPORTIONS OF INDIVIDUA AND DEMONSTRATION EXERCISES

Various combinations of the individua and the demonstration plans were pre sented in Table XXII. Table XXI

sents a more detailed study of the ctices indicated in column *E* of Table II; it presents the relative propor- is of individual pupil experimentation l pupil- or teacher-demonstration in se laboratory courses in which these plans are combined. Table XXIV read thus: Of 834 teachers of biology o responded to this item, 73 or 8.8 dividually. This tendency was greater with the teachers of chemistry and physics than with those of biology. Taking the teachers of general science as a whole, the number who demonstrated more of the exercises than they required the pupils themselves to perform (Columns 1 and 2), almost exactly equals the number who gave more individual than

TABLE XXIV

UMBERS AND PERCENTAGES OF TEACHERS OF THE FOUR MAJOR BRANCHES OF SCIENCE REPORTING CERTAIN PROPORTIONS OF INDIVIDUAL AND DEMONSTRATION LABORATORY WORK

	*Proportions**					
	i, 0-24 *d*, 76-100	*i*, 25-49 *d*, 51-75	*i*, 50 *d*, 50	*i*, 51-75 *d*, 25-49	*i*, 76-100 *d*, 0-24	*Total*
logy						
Number	73	43	76	149	493	834
Per cent	8.8	5.2	9.1	17.9	59.1	100.1
mistry						
Number	16	9	18	78	563	684
Per cent	2.3	1.3	2.6	11.4	82.3	99.9
eral Science						
Number	227	88	112	126	194	747
Per cent	30.4	11.8	15.0	16.8	26.0	100.0
sics						
Number	19	25	32	143	569	788
Per cent	2.4	3.2	4.1	18.1	72.2	100.0

* The teachers in responding to this item, followed these directions on the questionnaire: Please write the name of each course you are teaching this semester, in which some of the laboratory experiments are performed by the pupils themselves while others are demonstrated but are required to be written-up as laboratory reports. Write in the parentheses the approximate percentages of the experiments which are performed by each method."

cent had fewer than one-fourth of laboratory exercises performed individually by the pupils, while they either monstrated themselves or had the pu- s demonstrate more than three-fourths the exercises; 43 or 5.2 per cent had ween a fourth and one-half of the ercises performed individually and be- een half and three-fourths performed demonstration; etc.

It will be noted by combining data in fourth and fifth columns of Table XIV that the teachers of all of these bjects, except general science, had the pils perform most of the exercises in- demonstration experiments (Columns 4 and 5); thus 42.2 per cent used the demonstration more than they used individual pupil experimentation, while 42.8 per cent used the individual more than the demonstration method.

Data not included in Table XXIV reveal the fact that the teachers of the other branches of science who used a combination of individual and demonstration exercises used more of the former than of the latter, though in no case was the proportion of individual experiments relatively so great as with chemistry and physics.

A comparison of the data from the different groups of schools shows that, of the teachers who combined individual pupil experimentation with demonstration, those in the larger schools required a somewhat greater proportion of individual experiments than those in the smaller schools.

exercises singly; 180 or 13.9 per cen had the pupils work in pairs; 125 o 9.7 per cent allowed their pupils to wor in groups of three or more; 406 or 31. per cent had the pupils perform some o the exercises singly and others in pairs 117 or 9.1 per cent had their pupils per form some exercises singly and the res

TABLE XXV

NUMBERS AND PERCENTAGES OF TEACHERS OF THE FOUR MAJOR BRANCHES OF SCIENCE REPORTING LABORATORY WORK DONE BY PUPILS SINGLY, IN PAIRS, OR IN GROUPS

	*Plan**							
	A	*B*	*C*	*AB*	*AC*	*BC*	*ABC*	*Total*
Biology								
Number	308	180	125	406	117	60	93	1,289
Per cent	23.9	13.9	9.7	31.5	9.1	4.7	7.2	100.0
Chemistry								
Number	303	417	27	518	7	54	35	1,361
Per cent	22.3	30.7	1.9	38.0	.5	4.0	2.6	100.0
General Science								
Number	89	96	223	156	86	87	82	819
Per cent	10.9	11.7	27.2	19.0	10.5	10.6	10.1	100.0
Physics								
Number	57	402	345	296	82	208	137	1,527
Per cent	3.7	26.4	22.6	19.4	5.4	13.6	8.9	100.0

* These teachers supplied these data in response to the following instructions: "Please write the name of each course you are teaching this semester, in which the pupils themselves perform some laboratory experiments. Write in the parentheses after it *A* if the pupils perform these laboratory experiments singly; write *B* if they perform the experiment in pairs; *C* if they perform the experiments in groups of three or more. If you use a combination of these plans please indicate which; for example, *AB* would indicate that some of the experiments were performed individually and the rest by the pupils in pairs."

PROPORTION OF LABORATORY EXERCISES PERFORMED SINGLY, IN PAIRS, OR IN GROUPS

Table XXV is a further elaboration of Table XXII. It shows the relative proportion of those teachers of biology, chemistry, general science and physics offering courses in which the pupils themselves perform some of the laboratory exercises and the mode in which this was done, that is, by pupils singly, in pairs, or in groups. The table is read thus: Of 1,289 teachers of biology who responded to this item, 308 or 23.9 per cent had their pupils perform laboratory

in groups of three or more; 60 or 4.7 per cent had the pupils perform the exercises either in pairs or in groups of three or more; and 93 or 7.2 per cent used all three plans, that is, the pupils performed some exercises singly, some in pairs, and some in groups.

It will be noted from Table XXV that the modal plan for biology and chemistry followed by, respectively, 31.5 and 38.0 per cent of those teachers was that of having a combination of individual experimentation and experimentation in pairs. The modal plan for general science, followed by 27.2 per cent of those

hers, was that of having the pupils eriment in groups of three or more. modal plan for physics, followed by per cent of those teachers, was that having the pupils work in pairs.

is interesting to compare the re- tive percentages of the teachers of four major branches of science who less clearly drawn between manipulation by pupils individually and manipulation by pupils in pairs or in groups than is the distinction between manipulation by pupils more or less individually and demonstration by the teacher or by a pupil before the whole class. This hypothesis is especially significant when con-

TABLE XXVI

UMBERS AND PERCENTAGES OF TEACHERS OF THE FOUR MAJOR BRANCHES OF SCIENCE USING ONE TEXTBOOK, A SYLLABUS BASED UPON ONE TEXTBOOK, OR A SYLLABUS BASED UPON NO ONE TEXTBOOK*

	A	*B*	*C*	*AB*†	*AC*†	*BC*†	*Total*
ogy							
Number	612	626	222	24	9	5	1,498
Per cent	40.9	41.7	14.8	1.6	.6	.4	100.0
mistry							
Number	938	379	105	29	10	6	1,467
Per cent	63.9	25.8	7.2	1.9	.7	.4	99.9
eral Science							
Number	943	418	140	20	6	5	1,532
Per cent	61.6	27.3	9.1	1.3	.4	.3	100.0
sics							
Number	1,079	379	76	31	10	0	1,575
Per cent	68.5	24.0	4.8	2.0	.7	.0	100.0

* The teachers supplied these data in response to the following request: "Please write e name of every science course you are teaching this semester. Write in the parentheses ter it *A*, if the course follows one textbook; write *B* if it follows a syllabus based upon e textbook but with several other textbooks for supplementary references; or write *C* if it llows a syllabus based upon no one textbook but with several textbooks used for references."

† The interpretations of these items are not obvious; they probably represent courses in hich different practices are followed with different portions of the same course.

the pupils perform the exercises gly (namely 23.9, 22.3, 10.9, and 3.7 cent) with those who followed other ns of pair- or group-experimentation. om these data and those in preceding les there seems considerable substanti- on of the hypothesis that, in the minds a great number of teachers of science secondary schools, individual pupil ex- rimentation does not mean necessarily t each pupil actually performs the ercises entirely by himself but that he, s partner, or some pupil in his group rforms each exercise; that is, the hy- thesis is that the distinction is much sidered in the light of relative learning values derived by pupils from working singly, in pairs, and in groups, as determined by extensive research by Carpenter and others.[8]

Data not included in this table indicate that to some extent the proportion of exercises actually performed by individual pupils was somewhat greater in the larger than in the smaller schools. Practices with respect to the other branches

[8] See *Thirty-First Yearbook* of the *National Society for the Study of Education*, Chapter VII.

of science do not vary noticeably from those followed with respect to the four major branches of science.

PROPORTIONATE USE OF SINGLE TEXTBOOK AND SYLLABUS COURSE

Table XXVI shows the numbers and percentages of the teachers of the four major branches of science who used a single textbook, or a syllabus. The table is read thus: Of 1,498 teachers of biology who responded to this item, 612 or 40.9 per cent used a single textbook with the course; 626 or 41.7 per cent followed syllabi based each upon a single textbook but with several other textbooks for supplementary references; 222 or 14.8 per cent used syllabi each based upon no single textbook but with several textbooks used for references, etc.

The modal plan followed by the teachers of biology was that of having a syllabus based primarily upon a single textbook, though practically as great a number used a single textbook instead of a syllabus; a majority of the teachers o the other three subjects used a sing textbook. A combination of the data o the first two columns reveals the fa that, respectively, 82.6, 89.7, 88.9, an 92.5 per cent of the teachers of thes four subjects followed either a sing textbook or a syllabus based upon single textbook with supplementary references. It would seem from the data that there is more latitude with biology than with the other three subjects, since more than half of the teachers of that subject used a syllabus of some sort, and another 14.8 per cent used a syllabus based upon no particular textbook.

Data not shown in this table reveal the fact that the single textbook was favored by a majority of the teachers of physiology and physiography but that a syllabus plan of one or the other sort was used by a majority of the teachers of each of the other branches of science. Practices in large schools did not vary noticeably from those in small schools.

TABLE XXVII

NUMBERS AND PERCENTAGES OF TEACHERS OF THE FOUR MAJOR BRANCHES OF SCIENCE USING PERIODICAL LITERATURE AS A REGULAR PART AND AS AN OCCASIONAL PART OF THEIR INSTRUCTIONAL MATERIALS*

	Regular Part	*Occasional Part*	*Total*
Biology			
Number	174	955	1,129
Per cent	15.4	84.6	100.0
Chemistry			
Number	153	1,025	1,178
Per cent	13.0	87.0	100.0
General Science			
Number	364	913	1,277
Per cent	28.6	71.5	100.0
Physics			
Number	152	1,059	1,211
Per cent	12.6	87.4	100.0

* The teachers supplied these data in response to the following request: "Please write *A* after the name of each science course you are teaching with which you use periodical literature, as *Popular Science, Current Science, The Science Classroom,* etc., as a regular part of the instructional materials; write *B* after the name of the science course if you introduce such periodical literature only occasionally as instructional materials."

se of Supplementary Periodical Literature

able XXVII shows the numbers and entages of the teachers of the four or branches of science who used odical scientific literature as a regular, as an occasional, part of their teach- materials. The table is read thus: ,129 teachers of biology who reported item, 174 or 15.4 per cent used odical literature, such as *Popular nce, Current Science, The Science* ical literature, or because they overlooked the item. By further comparing the total numbers of teachers of these four branches with the largest corresponding totals found in any previous tables, however, it will be seen that a large majority of these teachers of science make more or less use of periodical scientific literature in connection with their classroom teaching.

Data not included in Table XXVII show that the teachers of the other

TABLE XXVIII

Numbers and Percentages of Men and Women Teachers of Science Whose Duties Included Responsibility for Various Numbers of Extra-Curricular Activities

	Number of Activities					
	1	*2*	*3*	*4*	*5*	*Total*
(Number)	1,736	756	188	40	3	2,723
(Per cent)	63.8	27.7	6.9	1.5	.1	100.0
nen (Number)	605	222	55	9	0	891
nen (Per cent)	67.9	24.9	6.2	1.0	.0	100.0

sroom, etc., as a regular part of the ructional materials, while 955 or 84.6 l such literature only occasionally as ructional materials.

will be noted that the teachers of eral science who made classroom use periodical literature of this type used or regular instructional materials to a ater extent than the teachers of the r three subjects; the teachers of sics used such materials least.

n interpreting Table XXVII it should remembered that the table presents concerning the practices of those hers of science only who reported they made more or less use of peri- al scientific literature. A comparison he totals in this table with those in vious ones shows that several hundred hers of each of the four major hches of science made no response to item either because they wished in way to indicate that they made no sroom use whatever of such period- branches of science follow practices with respect to periodical literature similar to those followed by the teachers of the four major branches.

Extra-Curricular Duties of Teachers of Science

Table XXVIII shows the numbers and percentages of men and women teachers of science who assumed responsibility for one or more extra-curricular activities in addition to their teaching. The table is read thus: Of 2,723 men teachers of science who responded to this item, 1,736 or 63.8 per cent of the men and 605 or 67.9 per cent of the women had charge of only one extra-curricular activity; 756 or 27.7 per cent of the men and 222 or 24.9 per cent of the women assumed responsibility for two; etc.

Data not included in Table XXVIII show that there is a very wide variety in the sorts of activities which these science teachers sponsored. The number

and variety of these activities, moreover, increased with the size of the school. The activities most frequently listed, in descending order of their frequency of mention, were coaching athletics, sponsoring a science club, and sponsoring a class; other activities frequently listed were sponsoring Hi-Y, sponsoring publications, coaching debate and dramatics, sponsoring boy-scout and girl-scout work, directing band and orchestra, etc. Many of these activities had no obvious connection with the teaching of science.

PROFESSIONAL READING OF TEACHERS OF SCIENCE

Because of space limitations the voluminous data supplied by the various teachers in response to the request t indicate what educational and scientifi publications they read regularly and oc casionally cannot here be tabulated. Th occasional reading of professional lit erature is far more frequently reporte than its regular reading. The educa tional publications most frequently liste both for regular and for occasional read ing were *School Science and Mathe matics, Science Education, Journal o Chemical Education,* and *The School Re view.* Of the scientific journals, thos most frequently listed are *Science New Letter, Popular Science Monthly, Sci entific American, Science, Science an Invention, Chemistry Leaflet, Scientifi Monthly,* and *The Science Classroom*

Index To Volume VI

INDEX OF AUTHORS OF ARTICLES AND REPORTS

The North Central Association Quarterly

Volume VI MARCH, 1932 Number 4

FEATURES

THE OFFICIAL ORGAN OF THE NORTH CENTRAL ASSOCIATION OF COLLEGES AND SECONDARY SCHOOLS

THE NORTH CENTRAL ASSOCIATION QUARTERLY

THE OFFICIAL ORGAN *of the* NORTH CENTRAL ASSOCIATION
OF COLLEGES AND SECONDARY SCHOOLS

The North Central Association Quarterly is published by the North Central Association of Colleges and Secondary Schools on the first day of June, September, December and March. It is the official organ of the Association, and contains the proceedings of the annual meeting of the Association, together with much additional material directly related to the work of the Association. The subscription price is $5.00 a year, or $1.25 a copy. All members of the Association—institutional and individual—are entitled to receive the Quarterly gratis in connection with their annual dues. A special subscription price of $3.00 a year is permitted to school libraries, college libraries and public libraries. All remittances should be made payable to the NORTH CENTRAL ASSOCIATION QUARTERLY.

Executive and Editorial Office: 1439 University Elementary School Building, Ann Arbor, Michigan.

Entered as Second Class Matter May 12, 1926, at the Post Office at Kalamazoo, Michigan, under the Act of August 24, 1912

Acceptance for mailing at the special rate of postage provided for in Section 1103, Act of October 3, 1917, authorized March 18, 1919

Publication Office: 119-125 Exchange Place, Kalamazoo, Michigan